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Cooperative Wildcatting Adopted In Little River District

By Lawrence E. Smith
N. P. N. STAFF WRITER

TULSA, Feb. 27

AN EXTENSIVE experiment in co-operative wildcatting will be made by lessees in the area south of the Little River field in the Seminole district in Oklahoma as a number of interested companies sufficient to make it appear certain of success formally approved the plan drawn by the operators' committee and Umpire Ray Collins on Feb. 27. The approval of all companies is expected by the end of the week.

Tentative locations have been made for 10 test wells, but indications at the meeting were that the number would probably be nine. The plan was put into final form Feb. 25 and submitted to the operators Feb. 27.

The tests would be co-operatively financed in the event they prove to be failures, the agreement providing that each owner of an offset 40 acres to the test well shall contribute $10,000 dry hole money, or a total of $30,000 for the three offset 40s. If the well is a producer, the operator who drills it and whose acreage it tests will, of course, bear all the expense.

It is by far the most comprehensive plan yet worked out by the operators since the early efforts were started in the Seminole district. It affords a fairly adequate test of property owned by 24 companies. No joint wildcatting campaign of equal magnitude has before been started in the oil industry.

That much progress has been made in the direction of co-operative effort is apparent when it is remembered that, about six months ago, the umpire urged a plan similar to this but received no encouragement.

The district to the south of Little River has long been due to be opened. Through agreement several wells that easily would be called "necessary" were delayed in starting. Two outstanding wildcats had been completed as producers and shut in to 100 barrels per day, with no offset drilling started. Obligations to royalty owners demanded that the district be opened soon.

The new plan embraces the following points:

The wildcat wells of Snowden & McSweeney and the Independent Oil & Gas Co., located respectively in the NW NW of 13-7-6 and the SW NW NW of 23-7-6, will be opened to full production March 1, the date when the present agreement expires, and the three offsets to each of them will be started at once. Each of the two producers will be on full time production until the first producing offset is drilled in, when the producer will be shut in to 50 barrels per day and the offset also.

COMPLETE accounts by staff writers of meetings of the Petroleum Division of the American Association of Mining and Metallurgical Engineers in New York Feb. 22 and 23 are to be found starting on Pages 21, 23 and 69 of this issue. Several important papers delivered at those meetings are also to be found in this issue.

In an area whose north boundary is the middle of Secs. 11 and 12, 7-6; its west boundary the middle of Secs. 10, 15 and 22, 7-6; its south boundary the south line of Secs. 22, 23 and 24, 7-6 and its east boundary the east line of Twp. 7-6, there will be drilled 10 test wells. No other wells, and the offsets to producing wells previously mentioned are to be started for a period of 75 days from March 1. Any of these 10 tests that is completed as a producer shall be shut in to 50 barrels per day. After the expiration of the 75-day period, any operator may start any well or wells he sees fit in the area, provided that, when the first of the second crop of wells is completed as a producer, all wells of the first series may be opened to full capacity.

WITH this 75-day period, and allowing 60 days for the completion of the second crop of wells, a respite of 135 days is thus given before unrestricted production is in effect.

Without some such plan, there easily could have been started 100 wells in this area. While it is not expected that this territory will be an improvement on the Little River performance, which has been generally sad, a sizable addition to the daily output could have been made by an intensive campaign.

As has been the custom in the past, this plan will be submitted to the state corporation commission to see whether it is in conflict with the state laws or the conservation policy of the commission.

Illinois "Gas" Tax is Nullified But Who Gets the $8,000,000?

Staff Special
CHICAGO, Feb. 25

ILLINOIS' 2-cent gasoline tax is out. The state Supreme court unanimously voted it unconstitutional Feb. 24. Oil companies all over the state reduced their tank wagon and filling station prices at the opening of business the next day. Now Illinois stands with New York and Massachusetts, without a gasoline tax. Approximately $8,000,000 has been collected since the law became effective Aug. 1.

This is the first important judicial decision against a gasoline tax. Oregon passed the first tax in 1919 and since then a gasoline tax has been passed by 46 states and the District of Columbia. Forty states have increased it at least once. None has reduced the tax, and Illinois alone has revoked it. But the Illinois law is definitely dead. If the state ever has a gasoline tax a new law will have to be passed. The court nullified the law for the following reasons:

1. The court found that the legislature attempted to amend a law by "indirection", i. e., by merely mentioning it and not setting forth the old law in full with the amendment as the constitution provides.

2. The title was found to be misleading, in that it did not identify the tax as one upon the motorist for the use of the state highways, but called it a gasoline tax, levied directly upon the petroleum industry.

3. The court ruled the policy of refunding 2 cents a gallon to farmers illegal because it was possible for farmers to buy without paying the tax and oil men had to pay the tax any way. In effect, this taxed one class and made a gift to another.

Who gets the $8,000,000 tax paid in is the question being raised by Illinois oil men. The few oil men who paid the tax under protest have a chance to get the money back, but lawyers admit it is a slim chance.

Some major operators are contemplating suing the state for the return of the money under the provisions of an illegal act, but no such litigation has been started yet. The consumer, from whose pocket the tax money actually came, has no chance at all for a refund. Wholly aside from the fact that such a refunding of money to motorists would be impossible of accomplishment, it would be illegal, because legally it was an oil man's tax and not a motorist's tax.

Standard Oil Co. of Indiana attorneys say they will not ask for a refund of the tax money from the state; as the chances of getting it are so slim and because the company has no moral right to it, having collected every cent of it from their customers under the name of tax.

Whatever becomes of the money already collected may be a matter for the voters and the administration to work out.

Chicago Motor club was the plaintiff in the action and it started the suit by applying to the Circuit court of Kane county, at Geneva, Ill., for a permanent injunction against the enforcement of the gasoline tax.

The Circuit court went into the merits of the case and denied the injunction last August but the Motor club appealed to the Supreme court. The Supreme court's decision resulted in the issuance of a mandate to the lower court to reverse its opinion and issue the permanent injunction. The Supreme court's decision was on Feb. 24 but the injunction was not issued until the next day.

The matter has a great deal of political significance locally. The gasoline tax law was an administration measure, fostered by Gov. Len Small in the fifty-fifth legislature. Mr. Small is a Republican and a candidate to succeed himself as governor.

THE Supreme court's opinion was written by Chief Justice Floyd Thompson, active candidate for nomination to run for governor on the Democratic ticket. This widens the breach between Chicago and "down state" politicians; Chicago against the tax and Illinois for it with Chicago paying considerably more than one third of it.

Governor Small has strengthened his position politically by granting paved roads to rural communities down state; paved roads which he can not deliver now unless he is able to call a second special session of the legislature and force through another gasoline tax law before his political race gets under way. It is predicted that he will do this.

Crude Still Blows Up in Toledo Plant

TOLEDO, O., Feb. 27.—Two men were killed and one was seriously hurt when a crude still at the plant of the Sun Oil Co. here blew up at 7:30 last night. Very little damage was done to the plant. The still that exploded was one of a battery of five running crude oil. The cause of the fire has not been determined. The still was operating at atmospheric pressure, according to Superintendent McCullen of the plant. The fire was put out with Foamite.

Kendall Officers Re-elected

BRADFORD, Pa., Feb. 25.—At a meeting of the directors of the Kendall Refining Co., held here Feb. 21, the following officers were re-elected: Otto Koch, president and general manager; Joseph H. Bovaird, first vice president; Howard H. Greene, second vice president and secretary; Irvine H. Shearer, treasurer and sales manager, and J. Bertram Fisher, assistant secretary, assistant treasurer and purchasing agent. These officers with A. J. Bond, F. L. Smith, Louis E. Koch and Thomas H. Kennedy form the board of directors.

Index to Coming Meetings

Western Petroleum Refiners Association, Muehlbach Hotel, Kansas City, Mo., March 6.

American Oil Men's Association, Hotel Stevens, Chicago, March 6, 7 and 8.

Wisconsin Independent Oil Jobbers Association, Hotel Plankinton, Milwaukee, March 14.

Independent Oil Men's Association of New England, American House, Boston, Mass., March 14, 15.

Minnesota Petroleum Association, Radisson Hotel, Minneapolis, March 14, 15.

Independent Oil Men of America, annual election, Stevens Hotel, Chicago, March 19, 20, 21.

American Association of Petroleum Geologists, business and technical sessions in San Francisco, March 21, 22, 23; field trips and entertainments, Los Angeles, March 24, 25.

American Oil Burner Association, Hotel Stevens, Chicago, April 3. 4, 5, 1928.

American Chemical Society, St. Louis, Mo., Apr. 16, 17, 18, 19.

National Petroleum Association, Cambridge Springs, Pa., April 19. 20.

Natural Gasoline Department of American Gas Association, Texas Fair Grounds, Dallas, May 7, 8, 9, 10.

National Oil Scouts of America, Amarillo, Tex., May 21, 22.

Natural Gasoline Association of America, Hotel Mayo, Tulsa, May 22, 23, 24.

That Dealer Account?

How Shaffer Oil & Refining Company Figures Whether Individual Dealers Can Be Taken On at a Profit or Whether Better for the Company to Leave Alone

THAT the Shaffer Oil & Refining Co., Chicago, had dropped from its books 12,000,000 gallons of dealer business because it did not make a profit for the company, was told to Illinois jobbers assembled in convention at Springfield two weeks ago, by B. L. "Barney" Majewski, vice-president and sales manager.

In the accompanying article is presented in detail the method by which the company determines whether a dealer account is profitable, and how its representatives are taught to pass on prospective accounts in this regard.

CHICAGO, Feb. 25

WAR has been declared on unprofitable dealer business by the Shaffer Oil & Refining Co., Chicago.

Already the company has lopped off 12,000,000 gallons of its former dealer business because investigation showed this business was not making money for the company. Its officials say it has already replaced this with dealer accounts that do represent a profit to the company.

Finding the individual unprofitable accounts was the big job. But every account is being considered singly and the proposition figured by somebody who is acquainted with it. C. T. Fantozzi of the sales department has been conducting school for about a month, showing the key men in the sales department how to evaluate any resale account.

Feb. 22 and 23 were school days in Chicago. Fifty division managers, agents and salesmen met to have the proposition explained. Last week the conference was in Omaha; in Minneapolis two weeks ago, and in Milwaukee three weeks ago. On March 4, the southwestern division will meet in Oklahoma City. The 300 men instructed in this way will take the news back to their own organizations.

Every man is instructed to figure how much a dealer account is worth. Of course each example is different because freight rates differ in the territory. Discount situations vary, and there are other variables, but the formula is the same in every case and the example used in Standard Oil Co. of Indiana territory is sufficient to show how it works. It is as follows:

A FILLING station owner in a small town in southern Wisconsin wanted to sell Deep Rock gasoline. He was sold on it. Besides, he was dissatisfied with the treatment he had received from the company that was supplying him. So he visited the Shaffer dealer nearby and asked for a contract. "I will change over to Deep Rock," he said, "if you will give me the same proposition I am getting now."

Problem: Shall we take him on?

Ordinarily any oil company salesman would give him a tentative promise, thinking, "surely, if Standard or Texas or Sinclair or Shell can make money on this proposition, so can we". But wait. Let's get the details on this dealer's prospective business.

He has one of the best locations for a filling station in the town. His credit and local business reputation are good. His markets are normal. Our company has no nearby outlet and we would appreciate the representation. (So far, o.k.)

THE station did 47,200 gallons of business in 1927, and that will have to be used as a basis of estimate for 1928, although competition might crowd in any day and divide his gallonage. The gallonage in 1927 classified 36,000 gallons of competitive gasoline (which is 60-62 400 e.p. in Wisconsin), 10,000 gallons of premium gasoline (64-66 375 e.p.) and 1200 gallons of motor oil.

The prospect wanted two 10-gallon visible vending pumps and two 1000-gallon tanks installed free. The other company had installed them and they were standing there but the dealer had signed a contract to represent the other company three years or pay the installation charge. So, if he changed oil companies he would try to pass that charge along from the old supplier to the new. Maybe the former source of supply would take their old pumps and leave the tanks, but the price would be the same.

On top of all this the dealer wanted $50 a month ground rental. That is a subterfuge for a cut price but it is common practice and he was getting it already and demanded it from the next man. Otherwise he would not change brands. The dealer simply said, "Give me new equipment or the equivalent and $50 a month rent, take it or leave it."

SEVERAL hours later this dealer's proposition was placed before the executives of the sales department for consideration. They took out the rule that measures profit and loss and laid it down against the proposition in this way:

"Experience has taught us that our operating cost from tank car alongside bulk storage to the customer's tank at this particular point is 3.306 cents a gallon. This does not include depreciation on the vending equipment, nor interest on the investment; but it does include inspection fees.

"The $50 a month rental is a cut price, call it what you like, and it must be figured by the gallon. So $600 a year against the 1927 gasoline gallonage (46,000 gallons) is approximately 1.3 cents a gallon. Freight into southern Wisconsin takes the Milwaukee rate. The prospect is in the lowest bracket of the Q.D.A., and the Wisconsin gasoline tax is 2 cents a gallon." Tabulated:

Operating cost	$.03306
Freight	.0261
State tax	.02
Q.D.A.	.01
Rental	.013
Total	$.10216

Net return to the sales department can be figured on this dealer's business by comparing the total of the above five items to the normal tank wagon prices, then prevailing in town. The tank wagon price of competitive gasoline was 16.1 cents and 19.1 on the premium product. The average price of motor oil to the dealer was 50 cents a gallon. Deducting the 10.216 cents (total of five expenses) from each tank wagon price, shows the sales department could get a net return of 5.884 cents a gallon on the competitive gasoline and 8.884 cents a gallon on the premium. The motor oil would net back 39.784 cents a gallon.

But the sales department has to pay the refinery for all this material, and it has to come out of the sales department's net return. Taking Platt's Oilgram for that day, the sales executives selected figures they would have to pay to their refinery

department. It was, say, Feb. 23, and the spot price published on that day of 60-62 400 was 6.625 cents; 64-66 375 was 7 cents flat. The motor oil in question was selling in carlots at 28 cents.

The return on the competitive gasoline was 5.884 cents and its Group 3 cost was 6.625 cents so obviously the company stood to lose $.00741 on every gallon, under existing prices.

The return on the premium gasoline was 8.884 cents and it cost 7 cents in the Group, so the company could enjoy a net back at the refinery of 1.884 cents above the tank car price.

The return on the motor oil of 39.8 cents, less the refinery cost of 28 cents, nets the company 11.8 cents a gallon on it.

Now the question is: do we make up on the lubes and the high test what we lose on the competitive gasoline?

COMPETITIVE gasoline, sold at a per gallon loss of .00741 would build up an annual loss of $266.76 if the dealer sold his 36,000 gallons. But 10,000 gallons of premium gasoline earning a margin of .01884 would bring in $188.40, and 1200 gallons of lubricants at .118 would earn $141.60 leaving the totals still on the profit side. The sum of $188.40 and $141.60 is $330 and leaves $63.24 after the loss on the competitive gasoline ($266.76) has been deducted.

A strict accountant might point out that the motor oils costs were figured the same as on the gasoline in spite of the fact that Wisconsin has no lube oil inspection and it does not carry the Q.D.A. nor the 2-cent state tax. That is true, but the motor oil volume is so small that it would make only a few dollars a year difference in result. And besides, operating expense on lubricants is higher; freight in L.C.L. shipments is higher, and it costs more to sell it to the dealer.

With a return of $63.24 a year on the proposition, even with Q.D.A. and ground rental figured in, most any oil company salesman would consider it a good proposition, if he only could make his salesmanager forget about the pumps and tanks his company must buy and give away. The "rub" comes on the cost of the pumps and tanks.

Two 1000-gallon tanks at $60 each are $120. Two pumps at $107.50 each are $215. The installation cost is $98.75 and the total runs to $433.75, but of course the cost can be spread out a little.

Tanks and pumps aggregately cost $335 and must be charged off in four years. The 25 per cent depreciation makes them cost $83.75 a year.

The installation cost of $98.75 has to be charged off in two years. The average customer does not last more than two years. In big cities they change sources of supply oftener than that and the installation charge has to be paid every time. So installation cost is depreciated at $49.38 a year.

Maintainance of equipment is entered arbitrarily at $50 a year. The company has found that to be a safe figure and a conservative one, after paying for broken parts, new hoses, new connections, etc., and painting the pumps twice a year.

Interest on the total investment of $433.75 is figured at 7 per cent. That may be considered a little high because if the company tried to make a large loan they would be fortunate to get 6 per cent. But, on the other hand, if the filling station man tried to borrow a small amount like this it would cost him 8 per cent or maybe 10, depending on his credit.

Thus the entire equipment cost can be reduced to an annual basis as follows:

Equipment depreciation	$83.75
Installation	49.38
Maintainance	50.00
Interest on investment	30.36
Total	$213.49

Down to the point of free equipment, Shaffer Oil & Refining Co. figured a profit on this proposition. The total annual return seemed to be $63.24 but that is completely swallowed up by equipment costs that run to $213.49 a year. So if this dealer sold as much in 1928 as in 1927; if he had no bad luck with wrecks or fires, and if he paid his bills, the best the company could figure out of his proposition was a loss of $150.25 a year.

The answer was "No. We don't want his business."

CERTAINLY there are a number of "If's" and "An's" but this was a hard-and-fast case. The dealer was to get what he wanted or he would not change. If it had not been for the $50 a month rental, the company supplying him would have been $449.75 a year to the good. If it had been only $25 a month, the company could have come out with $149.75 profit.

Coming! { **Three Uren Articles on Application Of Power in Oil Well Pumping**

Article 1—March 7th issue—Description of different appliances and devices useful in balancing loads on the power transmission mechanism, and in securing a longer stroke of more uniform velocity.

Article 2—Relative advantages of different types of prime movers in oil well pumping service and description of new devices useful in securing greater efficiency in power application.

Article 3—Review of recent improvements in multiple pumping practice.

Western Refiners to Discuss Co-operative Research

TULSA, Feb. 27.—Howard Bennette, managing director of the Western Petroleum Refiners Association, today announced the complete program of the annual meeting of the organization to be held at the Muehlbach hotel at Kansas City on March 6. The program follows:

Morning Session—9:30 A. M.

President Miskell's Report.

Report of Committee on By-Laws—George D. Locke, chairman.

Annual Report—Fayette B. Dow, Washington counsel.

Annual Election.

Report of Marketing committee—C. L. Henderson, Chairman.

Noon—12:30 P. M.

Luncheon for members.

Luncheon for newly elected board of directors.

Afternoon Session—2 P. M.

Address—"Some Accomplishments of Co-operative Technical Research," Dr. F. C. Whitmore.

Discussion—Led by Dr. Roy C. Cross.

Report of Research Committee—R. R. Irwin, chairman.

Evening—7 P. M.

Kansas City realty board dinner.

Scouts to Meet In Amarillo

HOUSTON, Feb. 25.—The executive committee of the National Oil Scouts of America, meeting in Dallas, Feb. 25, chose Amarillo for their 1928 annual convention and May 21-22 as their meeting date. W. N. O'Roark of Shreveport, president, and Ford Turner, San Antonio, chairman of the executive committee, will work with committees in making arrangements for the Amarillo meeting.

Combustion and Distillation Are Topics At A. I. M. E. Refinery Sessions

By Paul Truesdell
N. P. N. STAFF WRITER

NEW YORK, Feb. 24

TWO broad major subjects, combustion of fuel in still furnaces and the distillation of crude oil, in their relation to each other and to profitable refinery operation, occupied most of the program at the two-day meeting of the division of refinery engineering of the Petroleum Division of the American Institute of Mining & Metallurgical Engineers which ended here last night.

Other subjects that came up were the problems of handling acid sludge at refineries; relative efficiencies of the contact and percolating methods of filtering lubricating oils and relative availability of various clays; future sources of motor fuel; the possibilities the future holds for development through research of new products to be made profitably from petroleum to replace products now supplied from other sources.

The symposium on combustion centered on the problems connected with the use of radiant heat, particularly in carborundum tunnel furnaces, and recirculation of flue gases in furnaces to reduce fuel consumption and minimize destructive effects of high temperature and excess air on the equipment.

The distillation discussion centered upon the pipe still and the shell still as modernized into a high volume distilling unit by introduction of a centrifugal pump to jet continuously a thin film of oil against the fired bottom sheet of the still.

Walter Miller, Marland Refining Co., chairman of the refinery engineering division, opened the meeting the morning of Feb. 22. He introduced Dr. T. G. Delbridge, Atlantic Refining Co., as chairman of the meeting. The general topic was "Economical Application of Heat".

The first paper was on "The Modern Pipe Still", by H. S. Bell, petroleum engineer, New York, which is republished in this issue of NATIONAL PETROLEUM NEWS, starting on page 97. The paper was the subject of lively discussion by H. R. Swanson, Foster-Wheeler Corp., P. C. Keith, M. W. Kellogg Co., and R. B. Chillas Jr., Atlantic Refining Co.

"The Modernization of the Cylindrical Still", by C. W. Stratford was provocative of much discussion and questioning. Mr. Stratford described the manner in which shell stills at the refinery of the Associated Oil Co. in California had been modernized and their capacity increased to as high as 10,000 barrels each per day or more of crude oil through the application of equipment and operating methods, devised by him.

The system was described by Mr. Stratford in an article published in NATIONAL PETROLEUM NEWS page 49, Oct. 5, 1927. It consists mainly of a centrifugal pump installed in the still and a network of pipes provided with a multitude of nozzles through which the oil is jetted at high velocity against the bottom sheet and sides of the still.

IN HIS paper at this meeting Mr. Stratford went a step further and proposed the installation inside the still of a longitudinal flue about 3 feet in diameter. Firing is done into the flue, instead of under the outside of the still, and the oil is jetted against the outside skin of the flue all around. This proposal aroused a great deal of interest. Mr. Stratford's paper will be published in two parts, the first part in this issue.

H. W. Camp, general superintendent of refineries of the Empire Companies presided over the Wednesday afternoon session. The first paper at this session was "Sources of Automotive Fuels", by F. A. Howard and R. T. Haslam of the Standard Oil Development Co. (Standard of New Jersey). The paper was read by Mr. Haslam.

The authors have recently returned from a trip to Europe where they investigated work going on in connection with automotive design and automotive fuels. The paper seemed to dispose of the idea that the diesel engine is the coming power plant for automobiles or even for trucks, at least for a long time to come. It was also stated in the paper, to the surprise of many hearers, that motor fuel manufactured from coal by the Bergius process is now being sold in Germany in competition with gasoline imported from the United States. Mr. Haslam stated the belief, however, that the process worked out by Franz Fischer for the manufacture of motor fuel by combining hydrogen and carbon monoxide is still practically in the laboratory stage.

Control of refining processes was discussed from two standpoints at this session, "Physical Control of Refining Processes" being handled by Luis de Florez, consulting engineer, and "Technological Control of Refining Processes", by Albert E. Miller, process chemist and E. B. Phillips, chief chemist of the Sinclair Refining Co.

Mr. de Florez considered the matter from the standpoint of controlling the processes by means of instruments while the other paper, which was read by Mr. Miller, described in detail the building up and functioning of an organization for keeping a check on refinery operations to assure that the operating men are getting the full yields possible from the stocks being run, for investigation of new processes and of patents, and so on.

Mr. de Florez' paper was published starting on page 49, Feb. 22 issue of NATIONAL PETROLEUM NEWS. The first installment of the paper of Messrs. Miller and Phillips will be found in this issue. Written discussion of this paper was made by Herschel G. Smith, technologist of the Gulf Refining Co.

J. B. Rather, chief chemist of the Standard Oil Co. of New York, read a paper on "The Refinery Acid Sludge Problem". His paper also was published in the Feb. 22 issue of NATIONAL PETROLEUM NEWS, beginning on page 75.

In a written discussion of Mr. Rather's paper, L. L. Davis of the Marland Refining Co. told how his company is wrestling with the acid sludge disposal problem and described a new device that is being installed to burn the sludge under boilers. Mr. Davis' paper will be found in this issue.

HERSCHEL G. SMITH presided at the Thursday morning session which was devoted to a discussion of radiant heat. The first paper was on "The Use of Screened Radiant Heat and Its Application to the Petroleum Refining Industry", by A. E. Nash of the Alcorn Combustion Co. This company, headed by J. S. Alcorn, has been active the past three or four years in developing the carborundum furnace for use in refineries.

Mr. Nash was followed by John Primrose, vice president of the Foster-Wheeler Corp., with a paper on "Use of Open Radiant Heat in Tube Stills". These two papers were scheduled for

discussion by E. P. Kiehl, Atlantic Refining Co., J. S. Alcorn and Mr. Primrose. However, besides the written comments of these men, there was extended discussion and debate from all sides on various points involved. Mr. Nash's paper was published on page 70 of the Feb. 22 issue of NATIONAL PETROLEUM NEWS. Mr. Primrose's will appear in an early issue.

Another paper that aroused considerable discussion was that on "The Recirculating Furnace", by L. A. Meckler, Universal Oil Products Co. This paper dealt with systems for recirculating flue gases drawn from the furnace at one point and returned to it at another to insure complete combustion of the gases, reduce use of fuel and cut down oxidation of tubes. Preheating of the air for combustion is one feature of such systems.

IN WRITTEN discussion C. B. Buerger, general manager of refineries of the Gulf Refining Co. took issue strongly with the theory of recirculation, stating that, in a properly designed furnace, taking full advantage of radiant heat, recirculation of the flue gases is unnecessary. Mr. Buerger was not present, but his paper was read by Walter Miller. Other discussion was by D. G. Brandt, of the Cities Service Co. and E. P. Kiehl.

Mr. Brandt asserted his belief that the best way to get efficient application of heat is to design furnaces to take full advantage of all three features possible to use, radiant heat, convection and flue gas recirculation. Mr. Meckler's paper will be published in a forthcoming issue of NATIONAL PETROLEUM NEWS.

Robert E. Wilson, Standard Oil Co. of Indiana, presided over the afternoon meeting at which a new feature was presented. J. M. Lovejoy, vice president Amerada Corp., chairman of the Petroleum Division, had been asked by Dr. Delbridge, vice chairman of the refinery engineering division, to speak to the refinery engineers about the problems that face the production engineers.

Mr. Wilson, in introducing Mr. Lovejoy, said the refiners would be happy if the production engineers would deliver to their plants crude oil without any water in it and if "they would leave the d—— sulfur in the ground".

Mr. Lovejoy described in simple language the recently developed geophysical methods of locating possible oil bearing structures, particularly salt domes in the Gulf coastal regions of Louisiana and Texas.

"The Synthesis of Organic Chemicals by the Refiner", by H. W. Camp aroused considerable differences of opinion. This paper, which was published in full starting on page 17 of the Feb. 22 issue of NATIONAL PETROLEUM NEWS, pointed out some of the chemicals that he said might be synthesized from petroleum when processes and methods had been developed by research.

Benjamin T. Brooks, consulting chemist, differed considerably with Mr. Camp's view in many particulars. Dr. Brooks said that the possibilities of developing and successfully manufacturing from petroleum drugstore chemicals. dyes and so on was so remote and the business, if developed, would be of such comparatively small volume that he would not recommend any company to initiate a research program along such lines. He viewed as logical manufacture of alcohols and the like from petroleum, but not the more remotely related chemical products.

Dr. Delbridge supported Mr. Camp's view. In the free-for-all discussion which followed, Mr. Wilson and H. G. Smith particularly brought out that, with the limited number of men and the limited appropriations now generally available for research work, greater progress can be made and greater possibilities of profits realized by devoting the talents of research men to getting better results in the manufacturing and handling of the bulk products that now and probably always will furnish, the refiner's chief opportunity for profit.

Scientists Need Protection From Improper Quotation

NEW YORK, Feb. 23

ORGANIZATIONS before which papers on refinery technology or engineering are delivered should take all possible means to assure that the authors of such papers shall not be quoted without their authority, or misquoted, to further the ends of promotion schemes or otherwise.

That was the sense of the refinery engineering division of the A. I. M. E. at the New York meeting, when its members carried a motion offered by Dr. Delbridge. The motion resulted from a statement by Luis de Florez that a paper read by him before the American Petroleum Institute last December has been quoted extensively without his authority and against his will by a publication called "Cracking", in furtherance of a cracking process.

Mr. de Florez read in the meeting the following statement on the use that has been made of his paper:

"A publication styled 'Cracking', issued by the Public Relations Department of the Petroleum Conversion Corp., which, I am informed, is operating some form of the Knox process, has come to my attention. In a recent issue is printed what purports to be the substance of a number of statements made by me in a paper which I read at the A. P. I. meeting in December last.—

"In order to avoid any possible misunderstanding, I desire to make it entirely clear that the publication of such statements is entirely unauthorized by me; that I have no connection nor interest in the above mentioned corporation or the Knox process; that my paper was not written with any relation whatsoever to the Knox process.—

"IN MY paper of Dec. 5 I endeavored to draw some comparisons between Liquid and Vapor Phase cracking and, under the circumstances, isolated extracts may not carry their true meaning unless they are read in connection with the context.—

"I would, therefore, like to refer anyone interested to the paper itself for the proper interpretation of my views.—

"I wish it understood that I do not endorse the Knox process; that I never have endorsed it and have never intended to do so; and that the use of my name in connection with the article in 'Cracking' was wholly unauthorized."—

Camp Succeeds Miller

H. W. CAMP, general superintendent of refineries, Empire Companies, was elected chairman of the division of refinery engineering of the Petroleum Division of the A. I. M. E. at the meeting in New York. Walter Miller, director in charge of refining of the Marland Refining Co., was chairman during the past year.

E. W. Isom, Sinclair Refining Co., was appointed chairman of a committee to prepare a two-day program on refinery engineering topics for the 1928 annual meeting of the American Petroleum Institute, with the understanding that, if such a program is given there, Mr. Camp will be under no obligation to prepare a program for a refinery technology session of the American Institute of Mining and Metallurgical Engineers next February.

Repressuring During Flush Life of Pools Described as True Conservation

Staff Special

NEW YORK, Feb. 23

A START, at least, was made in the establishment of data on the effect of repressuring oil fields during their flush production period at the sessions on production engineering of the Petroleum Division of the American Institute of Mining and Metallurgical Engineers, held here Feb. 22 and 23.

A paper prepared by E. V. Foran, Marland Oil Co., which described repressuring experiments with both air and gas conducted on properties in the Turbeville pool of Archer county, Texas, and the Cook pool, of Shackleford county, Texas, early in the producing life of the properties attracted wide attention.

The presiding officer at the first session, J. B. Umpleby, Goldelline Oil Corp., Oklahoma City, and other speakers stressed the importance to the producing industry generally of work which would lead eventually to maintaining pressure on producing sands from the start of life of the field, rather than allowing it to be depleted and then building it up again by later repressuring work.

"No one knows how air or gas draws oil through the sand in a depleted field," he said. "To enliven the oil in an old field requires a solution of gas in the oil that takes time to bring about. Other conditions with regard to building up pressure again in an old field are not known to us. What is important for the industry is to never let the pressure go down on the field. As fast as the gas is taken from the wells in the flush stage of the pool, reintroduce it into the sand and keep the pressure up."

Conclusions of the experiments described in Mr. Foran's paper were that repressuring of producing sands during the flush stage retards water encroachment; that the flush period of the pool is the time when gas is available at the cheapest figure; that the gas is available in the sand to permit pumping of wells under back pressure; that the use of wet gas over dry gas is advantageous because of its higher solubility; that fewer wells are required to recover the oil, and that the repressuring of producing sands is a true measure of conservation of both gas and oils. (*Because of the widespread interest in Mr. Foran's paper it is republished in another part of this issue*).

Discussion of the paper brought out also the advantages of using air in early repressuring experiments because of the knowledge it allowed, as the air began to show up in other producing wells, of underground conditions, diffusion of the sand, rate of flow of the oil in the ground and so-on.

That work should be carried on to determine at what pressures in the flush periods of oil pools, repressuring can be carried on was suggested by Harry H. Hill, chief petroleum engineer, U. S. Bureau of Mines.

Data presented in a paper prepared by A. N. Bell, chief production engineer Marland Oil Co. of California relative to repressuring experiments in the Seal Beach field of California, working against field pressures of 1400 or 1500 pounds, was also received with a great deal of interest. This portion of Mr. Bell's paper was as follows:

Repressuring Against 1500 Pounds

"THE results of the Marland test at Seal Beach are interesting in that repressuring was started while several wells were still flowing. It is also interesting on account of the high pressures required to overcome the hydrostatic pressure exerted by high head edge water.

"The well first chosen for repressuring is about half way up the flank of the structure and had been on the beam making about 250 barrels of fluid daily, cutting about 60 per cent emulsion. The fluid level was 230 feet from the surface and the top of the sand was 4393 feet. Tubing was run to 4000 feet with a packer and the space above the packer filled with water to balance the high pressures.

"Gas was started in slowly to allow the fluid to be pushed back into the sand, and required three days at a pressure of 1500 pounds per square inch before starting into formation. The pressure was once built up to 1800 pounds and the compressor was shut down for a few hours. When again started, the well took gas at 1500 pounds, and after about three weeks the pressure was dropped to 1450 pounds. The present pressures required range between 1400 and 1450 pounds. Volumes as high as 1,500,000 cubic feet per 24 hours were put into the well.

"Increases as high as 50 per cent in production were obtained in wells up-structure, with very little increase in wells down-structure. Also, the water cut on one edge well materially decreased. After about 40 days the repressuring was moved to two wells farther down-structure and the well originally repressured was put on production. The result of this was a great increase in the production of wells one location farther down-structure, a rapid increase in one well one location up-structure, and a decrease in production of the wells farthest up-structure. Later the gas started to shortcut to the nearest well down-structure, nullifying to a certain extent the effects of the repressuring work. The increased production which could be definitely attributed to the repressuring work amounted to one barrel for each 495 cubic foot of gas introduced, and the increased gas production amounted to about 80 per cent of the gas introduced.

"THE interesting features of repressuring work as encountered in the various projects in California, and which appeared similar in all of the projects are as follows:

1. A rapid increase in production occurs during the first few months of repressuring with a falling off to a point slightly above normal after which usual declines continue at a fixed figure above normal production.

2. The usual tendency is for the gas to travel up-structure and show the greatest increase in up-structure wells. Selection of several edge wells for a concerted drive up-structure is more advantageous than so-called "five spot locations."

3. The greatest danger to successful results is from channeling of the gas to some nearby well which increases rapidly after once starting.

4. In the average California field, the effects of repressuring will extend several locations, preventing its use on small properties except by cooperative efforts.

5. Pressures higher than formerly thought economical or safe can be used if equipment is properly designed.

6. Repressuring steadies the flow in gas-lift wells greatly enhancing the value of gas-lift operations.

7. It was shown that oil recovered from a well in the Seal Beach field would probably not have been recovered by other methods, indicating one source of greater ultimate recovery by repressuring. This condition

A. W. Ambrose Heads A.I.M.E. Petroleum Division

NEW YORK, Feb. 24

A. W. AMBROSE, manager of production, Empire Companies, Bartlesville, is the new chairman of the Petroleum Division of the American Institute of Mining and Metallurgical Engineers, being elected at the general session the evening of Feb. 23 following the dinner of the division. He succeeds John M. Lovejoy, general manager of the Amerada Petroleum Corp., Tulsa.

Mr. Ambrose is a production engineer, having had several years experience with the Bureau of Mines before going with the Empire Companies. While with the bureau he carried on experimental work and published some authoritative work on losses of crude in storage by evaporation.

Dr. George Otis Smith, director of the U. S. Geological Survey, is the new president of the A. I. M. E., taking in all its divisions. He succeeds E. De Golyer, president of the Amerada Petroleum Corp.

The plan of organization of the petroleum division was changed somewhat in connection with the election of officers for the coming year. Heretofore there were two or three associate vice chairmen for each branch of the division, such as refining, production, production engineering and so on. These offices have been dropped and there is now one associate chairman for the entire division, this being C. R. McCollum, chief geologist, Union Oil Co. of California, Los Angeles.

E. O. Bennett, chief production engineer, Marland Oil Co., Fort Worth, is the new vice chairman for production engineering, succeeding Joseph B. Umpleby, Goldelline Oil Corp., Oklahoma City.

Joseph Jensen, geologist, Associated Oil Co., Los Angeles, is now vice chairman for production, replacing W. E. Wrather, consulting geologist, Dallas.

Arthur Knapp, petroleum engineer, United Gas Improvement Co., Philadelphia, is vice chairman for economics, taking the place of J. E. Pogue, consulting engineer, New York.

Prof. Lester C. Uren, head of the petroleum engineering department, University of California, Berkeley, Cal., is vice chairman of a newly created department of research engineering.

H. W. Camp, superintendent of Refineries for the Empire Companies, Tulsa, is vice chairman for refinery engineering, replacing Walter Miller, Marland Refining Co., Ponca City.

C. E. Naramore, production engineer, with the Sinclair interests, New York, was chairman of the entertainment committee, which saw to it that visitors were served lunch at the A. I. M. E. headquarters and otherwise made to feel at home while in New York.

existed at two different groups of wells.

8. In coarse grained sands the effect of repressuring travels far enough to indicate the possibility of greater well spacing than would otherwise be considered necessary, using the gas drive to drain the intervening areas. The reduced cost of such a program is self-evident."

New Developments in the Air-Gas Lift

NEW features of work with the gas lift were presented by C. V. Millikan, Amerada Petroleum Corp., as a result of his experiments and observations in the Mid-Continent field.

"Some interesting results are being obtained in Seminole and other districts by intermittent injection of gas," he said. "Gas is introduced during periods of three to five minutes at a rate considerably over that necessary to acquire the production at a steady rate of injection and is then cut off for from three to 15 minutes. Two to five wells are run from the same group of compressors. The total volume of gas required is sometimes reduced to as much as one-third of that required when it is introduced at a constant rate, without changing the amount of oil production."

"Holding pressure on the gas trap is becoming a more general practice, especially where the gas is recycled," said Mr. Millikan, in describing another new feature of gas lift installations. The gas can be delivered to the compressors at a pressure above atmospheric and the surplus power utilized by the larger volume delivered. Trap pressures up to 10 pounds do not often affect the production and frequently a much higher pressure can be held."

"Recent experiments have been conducted in lifting oil by means of a series of gas lifts within the well, the principle of which is identical with the stage lift which has been frequently applied to lift water from deep mines" he said. "The design for oil well pumping requires three strings of smaller pipe run inside of a larger size. At regular intervals a special coupling is installed, each of which is the beginning of another stage of the lift. Two of the small pipes are eduction pipes and the third a vent pipe for venting the gas spent in lifting the oil through the lower stages."

"IN THE operation, gas is introduced through the first coupling into one of the lift pipes, to raise the oil through the second coupling to the bottom of the third coupling where it is discharged, the oil falling back to the second coupling and the gas going up the vent pipe. More gas is introduced through the second coupling to lift the oil through the other lift pipe, through the third coupling to the bottom of the fourth coupling where it drops back to the third to be picked up again, the gas going into the vent pipe. This process is repeated until the oil reaches the surface, all of the stages working simultaneously."

Sentiment in favor of compressor plants for gas lift, gasoline extraction, repressuring and gas line boosting is gaining force and the near future will probably bring a different policy for some of the plants now operating and some that will be built, Mr. Millikan said. He brought out the present tendency towards operating wells with smaller production on gas lift, stating that, while pumping might be more economical than the gas lift, this was offset by the loss in production with pumping due to shutdown time.

Fluid Displacement Pump

Mr. Bell, of the Marland Oil Co., in the paper referred to earlier in this article, described a fluid displacement pump the Marland company has been using in California as an improvement of this production equipment. His description was as follows;

"During the last five months, the Marland Oil Co. of California has been trying a new device called a 'fluid displacement pump,' which has

Greetings to H. L. Doherty

J. M. LOVEJOY, vice president Amerada Corp., retiring chairman of the Petroleum Division of the American Institute of Mining and Metallurgical Engineers, sent a message of greeting during the meeting of the institute, to Henry L. Doherty, president of the Cities Service Co., who is recovering from a recent illness at Battle Creek, Mich.

The message was in recognition of Mr. Doherty's pioneer research work in the oil industry and carried expressions of the institute members' best wishes for a speedy recovery.

shown very encouraging results and is now being tried by several other companies. This device is run on the bottom of the tubing with either a packer or double string, so that no gas pressure can reach the fluid. The fluid rises in the tubing through a valve until it approaches its static level and ceases to have sufficient up-thrust to overcome the gas pressure exerted downward on the smaller gas valve, thereby opening the same and seating the oil valve as both are on the same item.

"The gas, which is introduced between the casing the tubing, enters the gas valve and lifts the column of oil in the tubing. When the top of the column of oil reaches the surface the gas starts to expand, reducing its pressure so that the upthrust of the oil again opens the oil valve and seats the gas valve, repeating the operation. The results obtained with this device to date, indicate that it or some similar device will go a long way toward solving many of the present difficulties in gas-lift operations."

Deep Well Drilling

The production engineering session was continued the morning of the 23d, Julius Fohs, geologist, presiding. A paper prepared by H. H. Dievendorff and F. W. Hertel, of the field department of the Union Oil Co. of California, described in detail deep well drilling technique in the Ventura Ave. field in California. Another paper prepared by F. W. Lake and H. A. Brett, of the Union Oil Co. of California, described a recording dynamometer which gives an indicator card showing the actual load on the polished rod at each point of the pumping cycle. A series of cards was shown which illustrated a wide variance in pumping loads.

These divergent pumping conditions were described as not only due to the peculiarities of individual wells, but also the result of the pumping equipment used and the method of operation. It was said that, if proper attention was paid to all factors which enter into and affect the pumping cycle, rod vibration, which is the primary cause of rod failure, may be reduced to a minimum, thereby increasing the life of the rods and production efficiency.

Factors influencing the recovery of petroleum from unconsolidated sands by water flooding were discussed in a paper by L. C. Uren, head of the petroleum engineering department, University of California, Berkeley, Cal., and E. H. Fahmy, Berkeley, largely as arrived at in a laboratory experiment carried on at the university to show the diffusion of various sands by water under varying conditions. Various factors discussed were; influence of size of sand grains on flooding efficiency, effect of sand porosity on flooding efficiency, effect of capacity, of physical properties of the oil, effect of temperature, influence of dissolved salts, effect of changing texture of sand, effect of the time element, effect of sand grain coatings, effect of gas bubbles.

A. W. AMBROSE

Manager of production, Empire Companies, Bartlesville, Okla., new chairman of the Petroleum Division, American Institute of Mining and Metallurgical Engineers

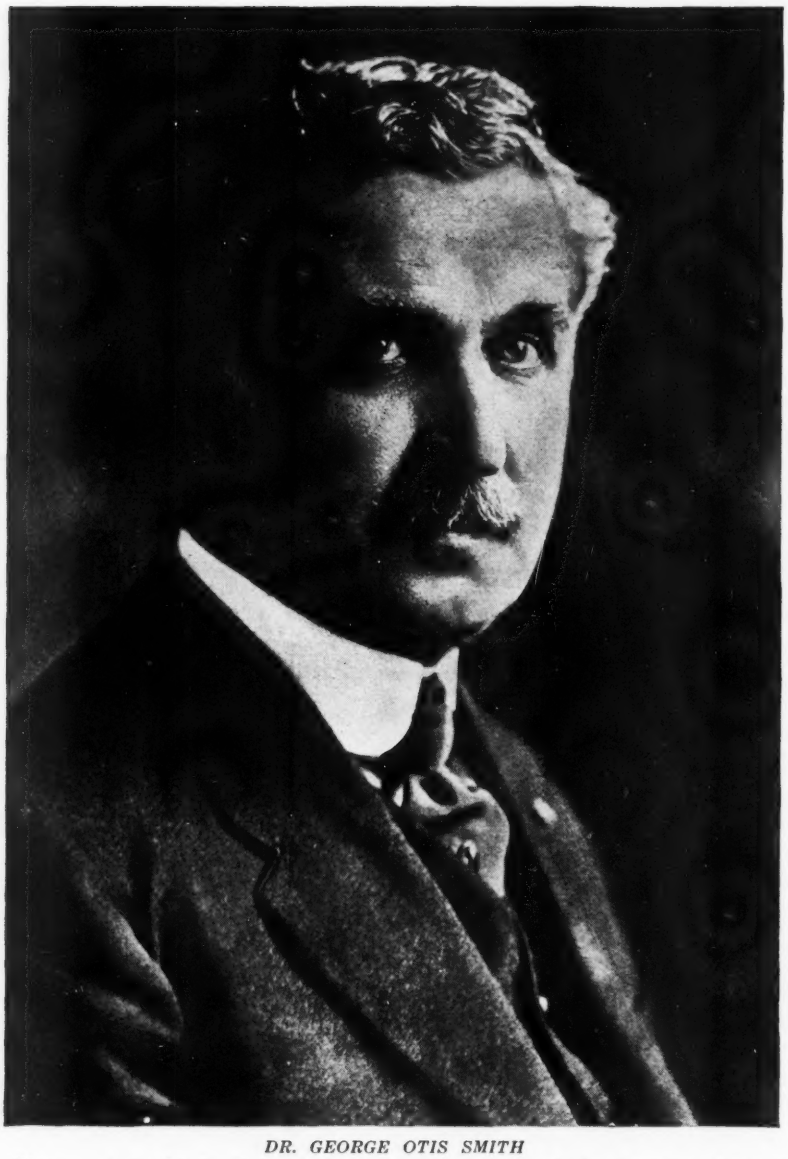
Influence of Dissolved Salts

THAT portion of the Uren-Fahmy paper discussing the influence of dissolved salts in flood water on flooding efficiency is given in the following:

"Several investigators have reported that certain water-soluble salts, when dissolved in the flood water, have an important effect in releasing oil held by adhesion on the sand grains. The beneficial effect resulting from the use of these reagents has been found to be primarily due to changes in the interfacial tension relationships between the oil, water and mineral grain surfaces. Well-established physical laws indicate that release of the adherent oil from the sand grains would be promoted by decreasing the interfacial tension between the flood-water and the mineral of which the sand grains are composed; or by increasing the interfacial tension between the oil and the mineral composing the sand; or, by decreasing the interfacial tension between the oil and the flood-water.

"For release of adherent oil from oil-wet sand grains, the interfacial tension between the oil and the mineral composing the sand, must be greater than the sum of the interfacial tensions between the water and the mineral and that between the flood-water and the oil. Sodium carbonate is an effective flooding agent, because it hydrolyzes in water, forming sodium hydrate, which attacks silica, thus reducing the interfacial tension between the water and the mineral grain surfaces to zero; and it is also found to have a similar effect on the interfacial tension between the floodwater and the oil, possibly due to some obscure reaction with certain constituents of the oil.

"A series of flooding experiments were performed with various solutions of water-soluble flooding agents, which confirm this theory; particularly that part of it which deals with the effect of decreasing the in-



DR. GEORGE OTIS SMITH
Director of the U. S. Geological Survey, new president of the American Institute of Mining and Metallurgical Engineers

terfacial tension between the oil and the flood water. The effect of sodium carbonate, sodium silicate, sodium hydrate, sodium bicarbonate, sodium borate, alum, hydrochloric acid, acetic acid, sodium acetate, phenol, carbonic acid and sodium chloride, were all tried in turn and their relative value as flooding agents determined.

"A METHOD was also devised, with the aid of the De Nouy Tensiometer, for obtaining comparative measurements of the interfacial tension between these solutions and the oil used. In a long series of experiments with the different reagents mentioned, it was consistently found that substances which reduced the oil-water interfacial tension also increased the efficiency of recovery of oil from the sand by flooding.

"The results of these experiments indicate that the strongly alkaline reagents, or those which are dissociated by water to form strongly alkaline solutions, have the property of releasing the adherent oil developed to the highest degree. Sodium hydrate is probably the most effective of all of the reagents used, but due to its rapid consumption through its reaction with silica, it gives a somewhat lower over-all recovery throughout the 16-inch length of a flooding tube than sodium carbonate or sodium silicate, which offer a higher degree of 'protective alkalinity.'

C. R. McCOLLUM
Chief geologist, Union Oil Co. of California, Los Angeles, associate chairman, Petroleum Division A. I. M. E.

"The acids and acid salts are found to be less effective than the alkaline salts, but all assist flooding to some extent: that is, a better recovery is effected through their use than is possible with distilled water. It is noteworthy that sodium chloride, a reagent commonly present in oil-field ground waters, and sodium bicarbonate, a product formed by the reaction of sodium carbonate on silica, are the least effective of all of the reagents tried.

"WHILE the interfacial tension between the oil and flood water has an important influence in determining the efficiency of recovery, it is probable that chemical reaction of the dissolved salt on the silica, of which most sands are primarily composed, is of greater importance in releasing the adherent oil. Reaction of the flooding agent with the silica of the sand, reduces the interfacial tension between the mineral and the flood water, increases the wetting power of the floodwater for the mineral, and thus promotes release of the oil. We have no means of measuring solid liquid interfacial tensions, but they are thought to be generally higher than liquid interfacial tensions. When the solid dissolves in the liquid, we know that the interfacial force must be approximately zero—hence, an important change in interfacial tension relationships tending to release the oil is indicated, though we cannot quantitatively measure its influence. It is found on inspection that the reagents giving the higher efficiencies are also those which are strongly ionized and react with silica.

"Inspection of the recoveries shows that the alkaline salts are more effective than the strongly acid salts, the latter being scarcely more effective than pure water. Divalent salts of the weak acids, however, are effective after hydrolyzing, but univalent salts of the weak acids are less effective. Neutral salts have little if any effect. The probable reason for the lower efficiency of the acidic solutions is found in the fact that the silica dissolves less readily in acids than in alkalis."

Conclusions on Recovery by Flooding

The conclusions of this paper were as follows:

1. Water-flooding is more effective in coarse-grained sands and in sands of high porosity, than in fine-grained sands or sands of low porosity.

2. Capillarity is not a controlling

factor in the process of water-flooding.

3. Variable texture of sand grains results in a reduction of flooding efficiency in comparison with what is possible in sands of uniform grain size.

4. Coatings of secondary minerals on sand grains may influence flooding efficiency to an important degree. Lime and iron oxide coatings are particularly detrimental in this respect.

5. Flooding efficiency decreases markedly as the viscosity of the oil increases.

6. Some oils have higher surface tension than others, but those having the lower tensions can be more effectively displaced from sands by flooding.

7. Temperature influences flooding efficiency, primarily by reason of its effect on the viscosity and surface tension of the oil.

8. A slow rate of advance of the flooding medium through the oil sand, results in greater recovery of oil than is possible by rapid displacement.

9. A definite relationship exists between the interfacial tension of the oil against the flooding medium and the percentage recovery obtained by flooding. The efficiency of flooding increases as this interfacial tension decreases.

PROF. LESTER C. UREN

Head of the petroleum engineering department, University of California, Berkeley, Cal., vice-chairman of new organized department of Petroleum Division, A. I. M. E., on research engineering. Prof. Uren is a regular contributor to National Petroleum News with articles on production methods

10. Certain water-soluble salts, when dissolved in the floodwater, have an important effect in releasing oil held on the sand grains. Experiments made with a variety of different chemical substances in solution in the floodwater, indicate that alkaline salts are more effective than the strongly acid salts, the latter being scarcely more effective than pure water. Divalent salts of the weak acids are effective to a lesser degree, after hydrolyzing, than the alkaline salts, and univalent salts of the weak acids are still less effective. Neutral salts have little if any effect.

11. The alkaline reagents are apparently in every case effective, due to the action of hydroxides produced by hydrolysis of the dissolved salt. The hydroxylion is active in attacking silica, forming acid silicates which are soluble in the flood water. It is in part due to reduction in the interfacial tension between the floodwater and the mineral of the reservoir sand, as a result of this reaction, that the flooding reagent owes its ability to release the adherent oil.

Favorable Characteristics of Sands

THE accompanying discussion of favorable characteristics of oil sands for water flooding was contained in a paper prepared by Paul D. Torrey, geologist, on "Some Factors Influencing Production of Oil By Flooding in the Bradford and Allegany Fields":

"The more or less widespread opinion that water flooding can only be successfully practiced in the Bradford and Allegany fields is certainly erroneous. Water flooding is being used with excellent results in several other Appalachian fields but, on account of legal restraints, details of its use have not been published. It is, however, true that, in several instances, water flooding has not yielded results comparable to those that have been obtained in the Bradford field. Where an adequate supply of water is available, the deciding factor in the results that may be obtained from water flooding appears to be in the lithologic character of the reservoir rock.

"Sands of high porosity but relatively low permeability, due to a small size of pore space, appear to be best adapted to water flooding. For this reason, a fine-grained sand with correspondingly minute pore spaces would probably be more favorable than a coarse-grained sand, which, although possibly possessing a much higher permeability, may be of much lower porosity than the fine-grained sand. The amount of oil held in a sand having fine pore spaces, after a long period of natural production, is probably greater than in a sand of large pore spaces, due to the greater opportunity for the adherence of the oil to the sand grains, and the higher frictional resistance of a sand of low permeability to fluid movement * * *"

Necessity the Mother of Invention

WALTER MILLER, retiring chairman of the refinery engineering division of the A. I. M. E. in summarizing progress made in refining technology at the review session the night of Feb. 23 stated that severe commercial and economic conditions in 1927 furnished a keen spur to the development of greater operating efficiency.

Most progress, he said, was made in better utilization of heat.

Heat transfer rates of 3000 B. t. u. per square foot per hour used to be considered good. Now a transfer rate of 25,000 to 35,000 B. t. u. per hour is common and engineers are talking of a rate of 50,000, 75,000 even 100,000.

Vapor to oil heat interchange has made progress during the year.

Use of thin-walled tubular heat exchangers as aftercoolers for condensed gasoline has made progress and represents economy.

Use of refrigerated finished product to cool oil on the way to be processed has advanced.

Progress has been made in producing side streams as desired from bubble towers, and in the production of heavy lube distillates by the single flash method in pipe-still-bubble tower units.

Vapor phase treating of cracked distillate has gained during the year.

Advance in contact filtering has been scored, as well as advance in the use of multiple hearth furnaces for restoring clay from percolating filters.

Operating improvements have been made in the cracking field.

Loss or Gain in Value of Daily Production in Oklahoma Under Crude Price Schedule of Feb. 21

FIELD	A.P.I. Prod. Feb. 18, 1928	Gravity A.P.I.	Daily LOSS or GAIN Under New Price	
N. Braman	3150	42		$189
S. Braman	1800	43		136
Blackwell	3800	39		114
Hubbard	3000	38		60
Thomas	1550	42		93
Tonkawa (Shallow)	5250	42		315
do (deep)	10,550	43		739
Garber	2850	44		228
do	3250	45		293
do	3300	46		330
do	450	47		50
Burbank	23,800	37		238
do	10,000	38		200
do	5000	39		150
Osage (other than Burbank)	600	33	18	....
do	10,800	34	216	....
do	6350	35	64	....
do	6250	36	....	....
do	1750	37	....	18
do	1450	38	....	29
do	1250	39	....	38
do	950	40	....	23
do	150	51	....	60
Watchorn	1000	42	....	60
Cushing	900	34	18	....
do	1350	35	14	....
do	100	36	....	....
do	2750	37	....	28
do	14,950	39	....	299
do	950	40	....	38
Yale-Jennings	200	33	6	....
do	50	37	....	5
do	2950	39	....	89
do	4150	42	....	249
do	500	33	15	....
do	1150	39	....	35
Davenport	2350	41	....	118
Bristow-Slick	3500	30	350	....
do	9500	31	855	....
do	500	38	....	10
do	5000	41	....	250
do	6400	33	192	....
N. Okmulgee	15,850	36	....	....
Lyons-Deaner	7700	37	....	77
Stroud	1100	41	....	55
Cromwell	1750	37	....	18
do	2550	38	....	51
do	5700	39	....	171
do	350	40	....	14
Papoose	300	36	....	....
do	1100	37	....	11
Papoose	1250	38	....	25
do	2050	39	....	61
do	650	40	....	26
Wewoka	50	34	1	....
do	100	35	1	....
do	250	36	....	....
do	750	37	....	8
do	1800	38	....	36
do	5450	39	....	163
Seminole	58,050	40	....	2322
Bowlegs	92,900	40	....	3616
Searight	18,800	40	....	752
Little River	34,150	40	....	1366
Earlsboro	114,600	40	....	4584
Duncan	150	29	20	....
do	300	30	30	....
do	700	31	63	....
do	850	32	34	....
do	900	33	27	....
do	900	34	18	....
do	1000	35	10	....
do	800	36	....	....
do	500	37	....	5
do	250	38	....	5
do	250	39	....	7
Graham	400	32	16	....
do	600	33	18	....
do	3050	34	61	....
do	1100	35	11	....
do	600	36	....	....
Fox	850	28	133	....
do	850	29	111	....
Healdton	900	28	144	....
do	1950	29	254	....
do	5800	30	580	....
do	1900	31	171	....
do	950	32	38	....
do	2900	33	87	....
do	14,450	34	289	....
Hewitt	1100	32	44	....
do	6000	33	180	....
do	1250	34	25	....
do	450	35	5	....
Sholem Alechem	13,900	32	556	....
Other miscellaneous Oklahoma fields	76,000	....	....	....
			$4675	$16,857
Approximate Daily Net Gain on fields of Oklahoma as Listed by the A. P. I.				$12,182

Seminole Benefits by Crude Changes

TULSA, Feb. 25.—Upon analysis it appears that the new price schedule posted by the Carter Oil Co. Feb. 21 and met in due course by the other purchasing companies is an increase of about 1½ per cent on the majority of Oklahoma crude, although it is also a cut to a great many operators.

Seminole, with 36 operators, is producing nearly half the oil produced in the state, and, as this oil is of 40 gravity, it has been increased 4 cents a barrel, or an approximate total increase in revenue from the five major pools of the district of about $12,500 a day.

The 110,000 barrels daily production of Kansas has an average weighted gravity of 36, the grade not affected by the new prices. The accompanying table, based on A. P. I. figures for Feb. 18, three days before the price revision, shows the fields of Oklahoma and the approximate amounts of the different grades of crude they produce, together with an estimate of the increase or decrease in the value of the production of each.

Study of the table above will show that nearly all the net increase goes to Seminole oil, and this increase is so small that it seems what has been accomplished has been a move on the part of the purchasers to readjust the prices of crude oil in accordance with what it is worth to the refiner without affecting the price of oil as a whole.

Farmer Co-Ops Increase In Nebraska

LINCOLN, Neb., Feb. 25.—The increase of farmers' co-operative oil companies in Nebraska in the last year was related in a recent issue of the Nioma Bulletin, official publication of Nebraska Independent Oil Men's Association. The data compiled by Charles M. Sutherland, secretary of the organization shows the number increased more than 100 per cent in 1927.

In 1926, there were 29 co-operatives doing business in Nebraska. They operated on the average, eight months of the year. They sold 2,612,147 gallons of gasoline which was 1.72 per cent of the state's total gallonage. But in 1927 the number increased to 67 co-operatives. They sold 8,272,300 gallons of gasoline which was 4.52 per cent of the state's total gallonage.

CLINTON, Iowa, Feb. 25.—Lorimer Dunlevy has resigned as sales manager for the Climax Engineering Co. effective March 15, to be general sales manager for the O. E. Szekely Co. of Holland, Mich., makers of commercial airplane engines.

Michigan Asks Oil Men About Price Variance

LANSING, Mich., Feb. 25.—The attorney general of Michigan recently asked advice of some oil men. When an oil man calls in a lawyer, that is an everyday occurrence, but when a lawyer calls an oil man into counsel, that's news.

Flash Points, the official publication of the Michigan Independent Oil Men's Association, edited by Wayne Hughes, secretary, in its latest issue told how Attorney General W. W. Potter recently wanted to know something about the oil marketing business and did the unusual thing. He asked some oil men about it.

It seems there was a price war of some age in Grand Rapids and Muskegon while Holland and Port Huron had escaped. The mayors of the two latter towns, jealous of the low priced gasoline in neighboring towns, asked Mr. Potter to start suit and compel the oil men to show cause why they should get 3.7 cents more for gasoline one place than another.

Mr. Potter sent out a questionnaire to a few Independent oil men in the state. They answered it, and some of them called on him. The result is that no suit was started.

Field Service and Publicity Planned To Make Ohio Market Profitable

By R. B. Stafford
N. P. N. STAFF WRITER

COLUMBUS, O., Feb. 24 PLANS to enlarge the field service of the Ohio Petroleum Marketers Association and to create a public relations department were given general approval at the association's annual meeting here Feb. 22, 23, and 24. The plans were outlined but details will be worked out by W. A. Milne, the association's executive secretary, the board of directors and 14 regional petroleum clubs in the state.

The convention was attended by more than 500, of which more than 200 were oil and gasoline marketers. Another 200 were representatives of refining, carload marketing and equipment companies. Forty-one exhibit spaces were used to display latest devices for marketing and handling petroleum products or for servicing automobiles.

The association's program calls for the creation of two new departments. One is a field service department to consist of two or more full time field representatives. The other is a public relations department to be in charge of a director with three subdivisions: legal, publicity and legislative.

Secretary Milne outlined the work of the field representatives to be to—

1. Drive home the items of overhead costs.
2. Assist in the installation of simple but adequate bookkeeping systems.
3. Suggest improvements in service at stations.
4. Increase loyalty and love of work among employes.
5. Remove ill will between competitors.
6. Lessen the number of marketers who are not making money, by moral suasion and argument based on facts and figures.
7. Drive home the folly of any sort of unethical practice, and the certainty that he only succeeds who continuously gives his customers and his competitors "the squarest kind of a square deal."
8. Train officers, directors and committees in all the 14 Ohio petroleum clubs so these clubs may function effectively and in harmony with the general program.
9. Explain state laws and departmental regulations and co-operate with government agencies in enforcement alike upon all.

J. L. MARSH
Vahey Oil Co., Youngstown, new president Ohio Petroleum Marketers Assn.

The association plans to have the field men spend five or five and a half days a week in the field. Conferences would be held in Columbus each Saturday afternoon at which developments of the week would be discussed.

MR. MILNE estimated oil marketers had squandered $14,000,000 in Ohio in 1927 because they were ignorant of their operating costs, or sought to get business by price warfare rather than true merchandising. This amount is almost 2 cents a gallon on the 770,000,000 gallons of gasoline sold motorists in this state last year. He estimated that 25 per cent of this loss could have been saved the oil industry under the association plan of field service. This would have been a saving of $3,500,000 at a cost of about $15,000.

The public relations department would disseminate through the newspapers and magazines of the state facts about the petroleum industry, a function that would supplement the public relations work of the American Petroleum Institute. It is the plan at present to try to accomplish this work with articles about the industry and with motor travel stories about points of interest in the state that would stimulate more motor trips.

The public relations department will cost the association about $25,000 a year, making the total cost of the proposed new activities approximately $40,000 a year.

The departments are to be financed by means of assessments based on members' gasoline gallonage in 1927. The assessments range from a fiftieth to a seventy-fifth cent a gallon a year with a $2,000 maximum for companies that do an annual business of more than 50,000,000 gallons.

MR. MILNE will explain the plan more in detail before each of the 14 Ohio petroleum clubs and endeavor to get three-year pledges for it. He said the plan could not be hazarded by depending on yearly association dues to support it.

The speaking program at the meeting in main supported various phases of the association's proposed activities: enlarged markets by intensive cultivation and better merchandising rather than by expansion of marketing outlets into unprofitable territories; need for preventing heavy overhead expense, and building a public relationship that will preclude hostile regulations and remove public suspicion.

"Profitable Merchandising," was the topic of Harry L. Fogleman, vice-president of Sheldon School, Chicago. This was an inspirational talk for methods to increase sales at a profit. B. H. Anglin, vice-president and sales manager of the Indian Refining Co., Lawrenceville, Ill., prepared a paper on "Volume and Expense vs. Profits." This paper was published on page 27 of NATIONAL PETROLEUM NEWS for Feb. 1, 1928, after it had been read before the Indiana Independent Petroleum Marketers Association at Indianapolis. Mr. Anglin in his paper emphasized profits rather than volume as the measuring stick for a marketing business.

Alvin E. Dodd, manager of the domestic distribution department of the Chamber of Commerce of the United States, in a paper entitled, "Facing the Facts in the Distribution Situation," broke down the oil and gasoline census figures compiled by his association and the U. S. Bureau of the Census. These figures for various cities have been published

from time to time in NATIONAL PETROLEUM NEWS. Facts about oil and gasoline distribution as given by him are published elsewhere in this issue.

E. Allen Frost, counsel of the Outdoor Advertising Association of America, told of accomplishments of his organization in its 30 years' life, and warned against expectation of too large results immediately by association members.

"You cannot fix prices," he said, "but you can control service." Pointing to overexpansion dangers he warned, "Don't try to serve the whole world. Just pick out a small part of it and do your best there. The trend in marketing, the government tells us, is toward quicker turnover of smaller stocks by intensive sales effort in restricted areas. If you have a commodity to sell, sell it at a profit. If you rebate you teach others to rebate and your business is ruined."

"Politicians have neither shame nor modesty in asking for higher gasoline taxes," Hubert B. Fuller, of Chamberlin, Marty & Fuller, Cleveland, counsel for the association, said in an address entitled "Our Relations with the Public."

IN 1927 motorists of the United States paid approximately $225,000,000 in gasoline taxes, Mr. Fuller said. In 1928 collections will run close to $275,000,000 or more than one-fourth the federal budget before the World war. He said oil distributors were entitled to at least 3 per cent of the taxes they collect to cover cost of collection, losses of merchandise and through taxes paid on bad accounts.

Harry D. Frueauff, Henry L. Doherty & Co., New York, in a paper entitled, "Fields for Increased Consumption of Petroleum Products?" enlarged on this subject on which he spoke at the Chicago meeting of the American Petroleum Institute last December.

He pointed out that, in 1927, stocks of petroleum above ground increased 63,000,000 barrels in the United States. Consumption of kerosene and lubricating oils had decreased and the total increase in use of all petroleum products was only 3½ per cent. Production was large and improved means of discovering crude oil, deposits and methods of recovering the oil made an unpleasant picture.

After reciting fields for extension of petroleum consumption such as domestic heating, aviation, marine uses, road building, bus and truck development, Mr. Frueauff gave these hints:

"The automobile has become a necessity. There was a time when its use was part of the week's pleasure. In the evening a jaunt around town or in the country with the family or friends. Its use for pleasure is waning. Some see a replacing in small part the history of the bicycle. Can't this be revised? We are on the threshold of another summer. Already many people are thinking of how and when they are going to take their vacation. Can't we help to mould their thoughts? Here again your association and its contact with other state associations can help. Here again your advertising and your contact with the public through your filling stations can be used to advantage.

"Hand your customers one week a little slip on the subject of visiting their mothers or their dear ones this summer. Of course, by auto. Hand them a slip that will appeal to the man tied down by indoor work or to one not in any too good physical condition. Tell them the good of fresh air, change of climate, etc.

"Have a slip that makes one want to see his country first and at its best. Many other arguments could be worked up that would help to mould the family mind on a vacation by auto. And so many people are interested in the financial end of it that much free or co-operative advertising could be obtained."

New O.P.M.A. Officers

Officers elected by the Ohio Petroleum Marketers Association and directors for a three-year term are:

President—J. L. Marsh, Vahey Oil Co., Youngstown.

First vice-president—R. E. Gerkins, Gerkins Oil Co., Dayton.

Second vice-president—S. E. McFarren, C. A. Pierce Oil Co., Akron.

Third vice-president—R. R. Hart, Knox Oil Co., Mt. Vernon.

Directors—William F. Burke, Kentucky Independent Oil Co., Covington, Ky.; F. M. Morrison, Accurate Measure Oil Co., Columbus; Charles McLean, Canfield Oil Co., Cleveland, and W. F. Daily, Roxana Petroleum Corp., Lima.

WILLIAM R. BOYD Jr., assistant secretary and counsel, American Petroleum Institute, in a paper entitled, "Uncharted Potential Petroleum Markets," discussed the conservation movement, present production, stocks and consumption, and development of new uses and outlets for petroleum products, emphasizing suggestions made by Mr. Frueauff.

About the use of cut prices to attract gallonage, Mr. Boyd said: "Continued ruthless competition and reckless cut price sales methods do not constitute a sound policy. It is a mere resort either to expediency or desperation. The practice is a terrible eye-opener. It reveals the seamy side of business and makes men cynical and pessimistic. It is merely giving excursion rates for public joyriding.

"Intelligent competition is useful and wholesome. It effects business economies. It protects the consumer from unreasonable prices. It makes men experience the thrill of battle. There is nothing that can sharpen a man's senses and develop his power and ability so acutely as for him to know that day after day determined competitors are in pursuit of him.

"It is a serious responsibility to run a business. The key to successful management is profit. One cannot have his cake and eat it. One cannot give away his profit and keep it too. Profit comes through stability in production and manufacture and the pursuit of a sound merchandising policy and sales practice. Stability in production will aid in stabilizing refinery operations. Sounder merchandising policies could be devised and different marketing practices followed if the competition were strongest to chart uncharted potential markets rather than a struggle for a greater share of an old and established market. If you believe in a principle, promote it. The way to promote a principle is to practice it. At any rate, no man should ever shut his mind to any new idea without challenging it with the question 'Why Not?'

"THE marketing end of the business is nearest to the ultimate consumer. The marketer has a definite responsibility to help his industry promote and maintain the right sort of public relations. The opinion of a consumer about an industry is formed largely by reading figures of supply and demand, or about production, manufacturing, storage or other conditions in the industry and his notion of their relationship to the price he pays for the product, plus distorted stories of dividends and capitalizations and gushing wells and competitive practices.

"A division of public relations is maintained within the institute, designed to furnish facts and figures about the oil business and assist the oil companies in correcting misinformation about our business. It invites and needs your help. It can provide you with valuable material for distribution. One of its recent publications, prepared for general public distribution, is a booklet entitled 'What Makes The Old Bus Go?' It contains the answer to 65 questions commonly asked about gasoline.

"An automobile owner drives into a Columbus, O., filling station and says 'Fill her up.' He complains about the price. What does the attendant say in reply? Perhaps, nothing. Probably he grins and shrugs his shoulders.

"Would it not be informative and good public relations work if that at-

tendant would say (translating the idea into his own language), 'Ever since the war it has been the persistent boast of the oil industry that among staples largely used and increasingly demanded, none showed such price moderation as gasoline,'—and then hand the customer the little A.P.I. leaflet answering the question 'What was the cheapest commodity in the United States last year?' This leaflet would show the motorist government figures proving that the petroleum industry has been able, in the face of a round 900 per cent increase in gasoline consumption since 1913, to maintain a price level far below other commodity groups and also that no commodity has since the war so nearly returned to the prewar price level as has gasoline.

"Suppose the price which the Ohio filling station charges the motorist is 19 cents per gallon. Would it be helpful if the motorist knew where his 19 cents goes?

"THE competition of Mid-Continent gasoline partly determines the retail price of gasoline in Ohio. Let us assume, for illustration, that the gasoline put into the motorist's auto tank was refined in Oklahoma and shipped by rail to an Ohio marketer who has in turn distributed it to the retail service station. Under such a condition the motorist's 19 cents would be distributed substantially as follows:

	Cents	%
Ohio gasoline tax	3.00	15.8
Railroad (for transportation)	3.56	18.7
Wholesale marketer and retailer gross	6.44	33.9
Oklahoma refiner	6.00	31.6

"The public will always be fair to an industry when it knows the facts. Let's give them facts in non-technical language and with striking illustrations of which we have so many. The opportunity to inform the public of the truth about the oil business is a challenge to every man engaged in the business."

Charles V. Truax, director of agriculture of Ohio and ex officio sealer of weights and measures, said he believed state officials and oil marketers have reached a lasting understanding concerning gasoline pumps.

Directors of the association gave William F. Burke, Kentucky Independent Oil Co., Covington, Ky., their retiring president, a leather golf bag and several clubs.

A silver cup was awarded the Tri-County Petroleum Club for the largest number of members that attended the convention who traveled the longest distance. Thirty members of this club were at Columbus. The Miami Valley club also had 30 members present but they traveled a shorter distance to the convention.

Stewart and Sinclair Appeal Cases to Higher Court

WASHINGTON, Feb. 27

WITH Col. Robert W. Stewart surrendered to the custody of the Senate, with Harry F. Sinclair, Henry Mason Day, W. J. Burns and W. Sherman Burns sentenced to jail for varying periods up to six months for Sinclair, four months for Day and 15 days for W. J. Burns, the ordinary citizen might suppose some sort of an end in the Teapot Dome matter was approaching. But he would be wrong. The sentences constituted but one step.

Sinclair, Day and Burns were found guilty of contempt of court Feb. 21 because they shadowed the Sinclair-Fall jury.

Col. Stewart was surrendered to the Senate on Feb. 23, Justice Bailey holding that he was not entitled to refuse to answer questions put to him by the Senate Public Lands committee as to whether he had talked with Blackmer or anybody else about the profits of the Continental Trading Co.

Sinclair, Stewart and the others have noted appeals to the higher courts. Thereby they merely added to the appeals already pending on other phases. Stewart probably will be indicted by the grand jury for the District of Columbia for alleged contempt of the Senate. Senator Thomas J. Walsh is not content to have the Senate be the only one to punish Stewart.

These appeals mean a converging of all phases of the matter toward the Supreme Court of the United States.

While the Stewart court proceedings were going on, the Walsh committee learned that $750,000 of Continental Trading Co. profit Liberty bonds are in the possession of H. M. Blackmer. They are in the vaults of the Equitable Trust Co. The committee has their serial numbers and has been given liberty to inspect them whenever it desires. Disclosure of Blackmer's share in the profits enabled the committee to trace $1,916,600 of the $3,080,000 profits invested in bonds by the Continental Co. The sum of the traced bonds is made up of the $233,000 given to Fall and Everhart on a ranch deal, $800,000 returned to the Prairie Oil & Gas Co. by James E. O'Neil; $61,600 as legal fees to H. S. Osler, $75,000 given the Republican national committee, presumably by Sinclair and the Blackmer share.

KARL C. SCHUYLER, attorney for Blackmer, told the Walsh committee, as authorized by his client, about his share of the bonds. He said that Blackmer retained all the bonds except one. That one he cashed to reimburse expenses incurred in the Continental Trading Co. deal.

Schuyler said Blackmer was apprehensive about litigation over the bonds by the Midwest Refining Co. and the Standard of Indiana, the proprietary company.

The Walsh committee interrogated Myron K. Blackmer, son of H. M. Blackmer, for an hour on Feb. 25. It obtained nothing from him that was of obvious value at the time.

In the course of the examination Chairman Nye brought into the case the name of the Western Oil Fields Corp. of Denver, also the names of former Governor Shoup of Colorado and John T. Barnett, of Denver, Democratic national committeeman from Colorado. Blackmer said that Shoup was president of the corporation and a friend of his father's and that both Shoup and Barnett were on friendly terms with his father but that he knew of no political relations between his father and either the former governor or the national committeeman.

Cordell Hull, chairman of the Democratic national committee, from 1921 to 1924, appeared before the committee to say that none of the Liberty bonds came to that committee to wipe out some of the deficit resulting from the 1920 campaign, as intimated in some of the testimony and in speculation of Chairman Nye.

THE oil industry has replaced the railroads, steel industry, and public utilities as the public "goat," and should tell its story to the public to dispel a cloud of suspicion that surrounds it, was the essence of Hubert B. Fuller's address on "Our Relations with the Public" before the Ohio Petroleum Marketers Association at Columbus.

What the oil industry has suffered, what it should guard against in the way of hostile legislation, and why it should foster public good will, are points brought out by Mr. Fuller, who is counsel for the association and several Independent oil companies in Ohio. Essential parts of his address will be published in a later issue of NATIONAL PETROLEUM NEWS.

Wildcat Well of Mexican Eagle Opens Field in Tampico District

By Paul Wagner
N. P. N. STAFF WRITER

HOUSTON, Feb. 25

TWENTY-SEVEN miles south of Alamo production, in the lower country division of the general Tampico district of Mexico, an important wildcat discovery has been made in Mecatepec by the Mexican Eagle Oil Co., Ltd. (El Aguila) of the Royal Dutch-Shell group.

Its No. 4 Mecatepec test is reliably reported flowing at the rate of 7600 barrels daily, 26 A. P. I. gravity oil, from a pay found at about 3,608 feet.

The Mexican Eagle's find is 15 miles north and a little east of the shallow Furbero drilling, where, in 1868, the original oil operations in Mexico were conducted. Although wildcatting was carried forward intermittently for years, it was not until 1907 that the first oil production was found in the Furbero area, in an upper contact zone of igneous and sedimentary rocks associated with volcanic plug structure.

Details of the formations penetrated in the Mecatepec drilling are lacking except that operations were in shale beds at about 3,600 feet. It is considered probable that oil of the region comes originally from the Tamasopa limestones of Cretaceous age, which yielded the "Golden Lane" production along the knife-edge fold between Dos Bocas and Alamo; but the gravity of the oil in the Mecatepec discovery may indicate migration from such a source into the overlying San Felipe beds of Tertiary Eocene age.

The accompanying map sketch indicates the geographical position of the Mecatepec discovery with reference to the Furbero development, at depths ranging down to 2,350 feet, and the Dos Bocas-Alamo operations of the so-called "Golden Lane."

Although production along the knife-edge, faulted fold in the "Golden Lane" area trends broadly in the direction of Mecatepec, the arc of a circle described by these earlier known occurrences would be ordinarily projected toward the Gulf of Mexico shore, through an area to the northeast of the present discovery. Geological conditions measured in association with the Furbero oil occurrence also indicate more probable relationship of the Mecatepec area with the last mentioned than the "Golden Lane" district.

Surface outcrops at Furbero consist almost altogether of lava-capped mesas, the remnants left by the erosion of a great flow that once

Geographical position of the Mecatepec Discovery.

covered most of this part of the Gulf Coastal plain region. Evidences of the flow vary in thickness from a few feet to 500 feet, with uniform inclination of several degrees to the northeast. Remnants of the flow are found in lava-capped mesas six miles northwest of Furbero, in El Brinco; nine miles north, in Mecatepec; and 12 miles east of south, near the Tecuantepec river.

THE general structure for some distance northward from Furbero, which would include the Mecatepec area, is that on an eastward-dipping monocline, the beds of which are described geologically as having been folded in Oligocene or post-Oligocene time and afterwards subjected to volcanic activity. Dense tropical jungle and a mantle of soil resulting from centuries of vegetable decay cover the region.

Indian tradition says that this part of the coast was settled during the Seventh or Eighth century and that oil seepages were noted by the early inhabitants, who called the Furbero locality "Cougas," which was later corrupted to "Cubas." The term "Cougas" is a Totonaco Indian word meaning a species of black wax, or oil.

In a paper published by the American Institute of Mining Engineers, in 1915, E. L. DeGolyer, then consulting geologist for "El Aguila," recited the original work of a certain Dr. Adolpho Autry, who in 1868 drilled for oil at Furbero. Later, the Compania Explotadora de Petroleo del Golfo Mexicano was formed at Mexico City to take over the properties, but the most petroleum obtained was 4 or 5 barrels daily and the workings were soon abandoned.

About 1901, the Mexican Petroleum Liquid Fuel Co., Ltd., was formed by English capital which included among the company's backers the late Cecil Rhodes of South African fame. Unsuccessful operations were carried on, after which the Oil Fields of Mexico, Ltd., was organized. It drilled the first commercial discovery and about 30 other wells, none of which, however, made more than about 200,000 barrels, maximum, ultimate recovery per well.

Several of the larger companies operating in the lower country of Mexico own acreage in the general Mecatepec region, along the Cazones river, but advices incident to the Mexican Eagle's present discovery do not indicate that property holdings are such as to bring about competitive drilling. Outlet of crude from the region may be provided without unusual difficulty because of its location with reference to the coast below Tuxpam.

7 Protests Filed on New Mid-Continent Rates

(By Telegraph)

TULSA, Feb. 27.—Seven protests have been filed with the Interstate Commerce Commission as a result of the new oil rates from the Mid-Continent field to parts of Indiana marketing territory which are scheduled to go into effect March 2. The commission has been asked to suspend the rate pending investigation. Action by the commission on the protests either ordering a suspension or denying a further postponement is expected before March 1.

Roxana Petroleum Corp. has alleged, in its protest, that the railroads have not carried out the intent of the commission as indicated in its decision in the 1925 Mid-Continent case. The Col-Tex Refining Co. has protested only its rates from Colorado to St. Louis and Chicago.

Protests have been filed by a number of organizations in Iowa and Illinois which allege that consumers are discriminated against because of the change in the rate relationship between their cities and Chicago. These organizations include the Clinton Manufacturers and Shippers Association of Clinton, Ia., Keystone Steel and Wire Co., Peoria, Dubuque Shippers Association, Peoria Shippers Association and Bloomington Shippers Association.

On practically Every Highway in U. S. ~Texaco Tank Trucks *and* WHEATON FAUCETS

A Texaco Tank Truck equipped with six Wheaton Type A Faucets. Here is also shown a larger view of this faucet.

THROUGHOUT the country, from ocean to ocean and from the Lakes to the Rio Grande, The Texas Company sends its tank trucks, delivering Texaco Products. Wherever you drive the highways you see those big trucks with the familiar red stars, telling the world who they are. And, if you will look at the rear, you will see a row of Wheaton Faucets—inconspicuous but important.

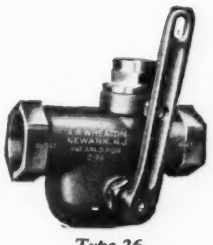
In 1912 The Texas Company ordered one Wheaton Faucet. Then they ordered more—always one at a time. Perhaps 25 went out to as many different points. Tests were made, and managers reported. Wheaton Faucets were elected! And from that time till this, Wheaton has been the standard tank truck faucet equipment throughout that great nation-wide organization.

Sufficient praise indeed!

Other Wheaton Products used by The Texas Company include Loading Valves, Swing Joints and Anti-Freeze Valves.

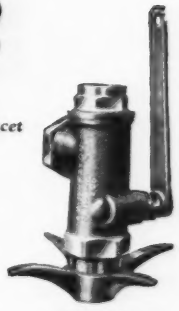
Anti-Freeze Valve

Type 24 Tank Truck Faucet



Type 26 Loading Valve

Double Swing Joint



Type 25 Loading Valve

A. W. WHEATON BRASS WORKS, NEWARK, N. J.

Wheaton

FAUCETS · VALVES · JOINTS · COUPLINGS · FILLERS · NOZZLES · FITTINGS

Compilation Of Mid-Continent Refinery Operations

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Mid-Continent Refinery Operations Week Ended February 24 (By Telegraph)

	Kansas	Oklahoma	North & Cent. Texas	North La.-Ark.	Total Week Ended Feb. 24	Total Week Ended Jan. 27
Plants Reporting	12	28	27	12	79	79
Crude Capacity (bbls.)	92,000	157,200	104,500	54,900	408,600	408,600
Cracking Capacity	30,700	52,600	16,200	22,700	122,200	122,200
Da. Av. Crude Runs	49,981 — 9.3	109,420 + 4.0	69,670 + 1.7	46,978 — 3.8	276,049 — 0.6	260,534
Da. Av. Other Oils	9,177 + 45.3	354 — 82.0	5,789 + 5.1	1,680 + 23.7	17,000 + 12.2	11,803
GASOLINE—Gallons						
Stocks, Feb. 17	14,025,000	50,608,000	21,397,000	3,281,000	89,311,000	79,262,000
Prod. 2-17 to 2-24	8,419,000 + 4.4	16,494,000 + 0.5	7,681,000 + 1.7	3,984,000 — 3.6	36,578,000 + 1.1	33,608,000
Ship. 2-17 to 2-24	8,235,000 + 14.2	14,418,000 + 1.7	7,458,000 + 21.3	3,190,000 — 18.4	33,301,000 + 5.9	31,975,000
Stocks, Feb. 24	14,209,000 + 1.3	52,684,000 + 4.1	21,620,000 + 1.0	4,075,000 + 24.2	92,588,000 + 3.7	80,895,000
Ratio Sales to Prod.	97.8%	87.4%	97.1%	80.1%	91.0%	95.1%
KEROSENE—Gallons						
Stocks, Feb. 17	3,328,000	6,919,000	2,003,000	548,000	12,798,000	14,094,000
Prod. 2-17 to 2-24	1,362,000 — 16.2	2,902,000 — 0.8	1,365,000 — 14.8	647,000 — 13.6	6,276,000 — 9.0	6,058,000
Ship. 2-17 to 2-24	1,380,000 — 30.5	2,619,000 — 17.1	1,597,000 + 34.2	717,000 — 11.9	6,313,000 — 11.7	6,213,000
Stocks, Feb. 24	3,310,000 — 0.2	7,202,000 + 4.1	1,771,000 — 11.6	478,000 — 12.8	12,761,000 — 0.3	13,939,000
Ratio Sales to Prod.	101.3%	90.2%	117.0%	110.8%	100.6%	102.6%
STOVE DISTILLATE—Gallons						
Stocks, Feb. 17	760,000	3,556,000	6,885,000	77,000	5,078,000	5,951,000
Prod. 2-17 to 2-24	440,000 +165.1	677,000 — 9.6	243,000 + 88.4	89,000 + 6.0	1,449,000 + 28.5	1,329,000
Ship. 2-17 to 2-24	330,000 — 16.9	687,000 — 5.8	411,000 +140.4	97,000 + 56.5	1,525,000 + 12.2	1,607,000
Stocks, Feb. 24	870,000 + 14.5	3,546,000 — 0.3	517,000 — 24.5	69,000 — 10.4	5,002,000 — 1.5	5,673,000
Ratio Sales to Prod.	75.0%	101.5%	169.1%	109.0%	105.2%	120.9%
GAS OIL—Gallons						
Stocks, Feb. 17	6,434,000	31,671,000	15,297,000	5,911,000	59,313,000	61,804,000
Prod. 2-17 to 2-24	1,278,000 + 0.2	1,829,000 + 32.6	859,000 — 20.5	2,287,000 + 1.7	6,253,000 + 4.5	5,329,000
Ship. 2-17 to 2-24	1,005,000 — 21.7	1,046,000 — 4.2	787,000 — 17.2	2,285,000 + 35.3	5,123,000 + 2.2	6,346,000
Stocks, Feb. 24	6,707,000 + 4.2	32,454,000 + 2.5	15,369,000 + 0.5	5,913,000 + 0.03	60,443,000 + 1.9	60,787,000
Ratio Sales to Prod.	78.6%	57.2%	91.6%	99.9%	81.9%	119.1%
FUEL OIL—Gallons						
Stocks, Feb. 17	9,946,000	30,100,000	39,920,000	13,400,000	93,366,000	92,625,000
Prod. 2-17 to 2-24	5,877,000 — 0.1	7,328,000 + 1.7	10,355,000 + 4.0	6,346,000 — 3.4	29,906,000 + 1.0	27,467,000
Ship. 2-17 to 2-24	6,536,000 + 9.3	8,094,000 + 11.8	13,312,000 + 70.8	4,951,000 — 21.3	32,893,000 + 20.5	26,905,000
Stocks, Feb. 24	9,287,000 — 6.6	29,334,000 — 2.5	36,963,000 — 7.4	14,795,000 + 10.4	90,379,000 — 3.2	93,187,000
Ratio Sales to Prod.	111.2%	110.5%	128.6%	78.0%	110.0%	98.0%

Gasoline Produced by Various Methods, Week Ended February 24

	Kansas	% of Total	Oklahoma	% of Total	Texas	% of Total	Louisiana-Arkansas	% of Total	Total	% of Total
Straight Run	5,105,000	60.7	12,588,000	76.3	6,315,000	82.2	1,624,000	40.8	25,632,000	70.1
Cracked	2,655,000	31.5	2,955,000	17.9	1,032,000	13.4	1,768,000	44.4	8,410,000	23.0
Natural	659,000	7.8	951,000	5.8	334,000	4.4	592,000	14.8	2,536,000	6.9
Total	8,419,000		16,494,000		7,681,000		3,984,000		36,578,000	

columns are % change from previous week.

Gasoline Shipments Rise 2,000,000 Gallons

Staff Special—By Telegraph
TULSA, Feb. 28

SHIPMENTS of gasoline from 79 refineries in the Mid-Continent field rose approximately 2,000,000 gallons in the week ended Feb. 24, refiners reported to NATIONAL PETROLEUM NEWS. Shipments from reporting plants totaled 33,301,000 gallons. Little change was made in the volume of gasoline produced, the total being 36,578,000 gallons, compared with 36,170,000 gallons in the week ended Feb. 17. The stock accumulation of 3,277,000 gallons was much smaller than in the preceding week.

Kansas refiners reported an increase in gasoline shipments of 1,000,000 gallons to 8,235,000 gallons and added only 184,000 gallons to their reserves. Shipments from Oklahoma plants increased only 244,000 gallons to 14,418,000 gallons and stocks were

Summary for the Month

Production and shipments, all reporting refineries, for four weeks ended Feb. 24. Change in stocks figured from Jan. 27.

GASOLINE

	Gallons
Production	139,744,000
Shipments	128,051,000
Net change in stocks	+ 11,693,000
Ratio sales to production	91.6%

KEROSENE

	Gallons
Production	25,785,000
Shipments	26,963,000
Net change in stocks	— 1,178,000
Ratio sales to production	104.6%

STOVE DISTILLATE

	Gallons
Production	5,317,000
Shipments	5,988,000
Net change in stocks	— 671,000
Ratio sales to production	112.6%

GAS OIL

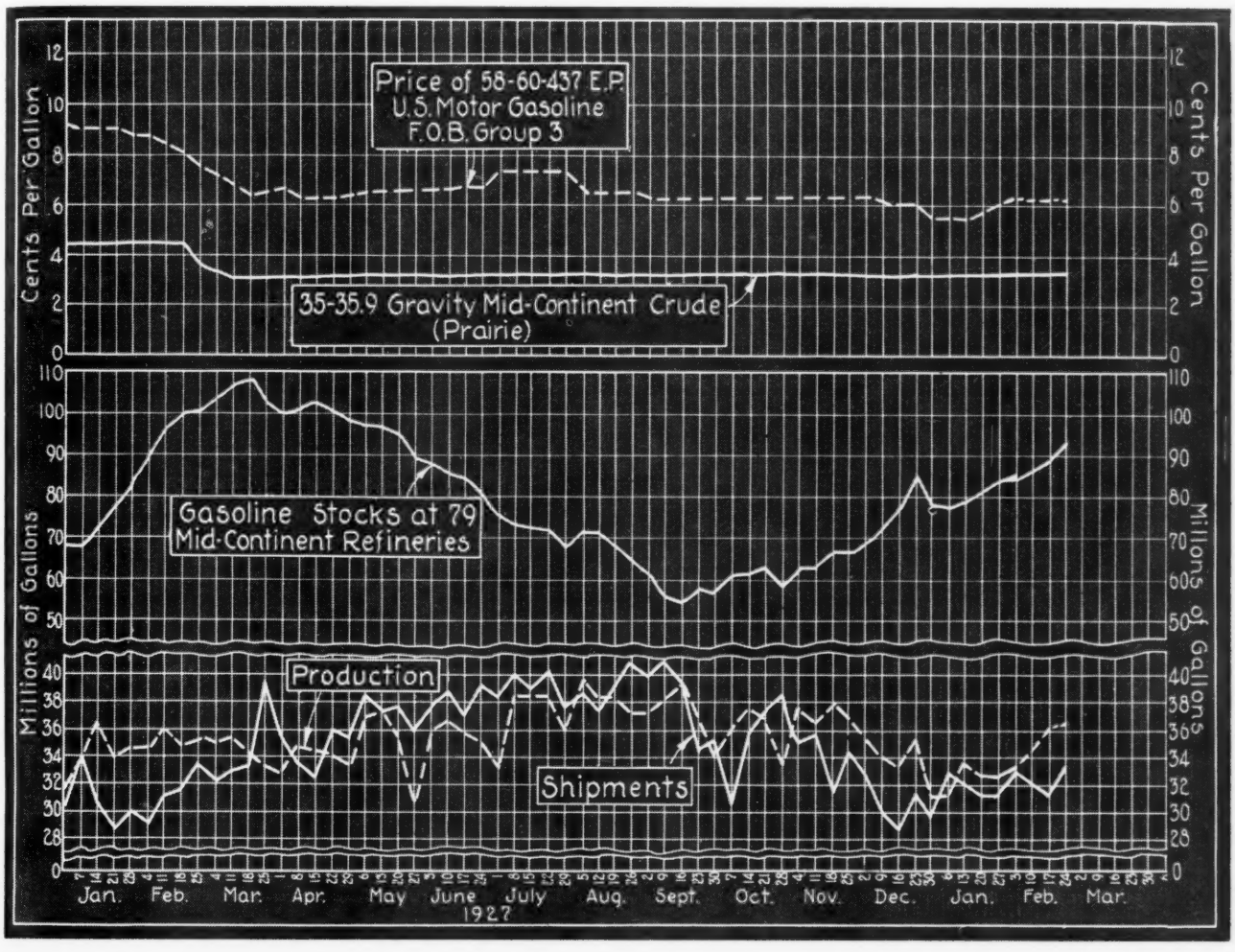
	Gallons
Production	25,212,000
Shipments	25,556,000
Net change in stocks	— 344,000
Ratio sales to production	101.4%

FUEL OIL

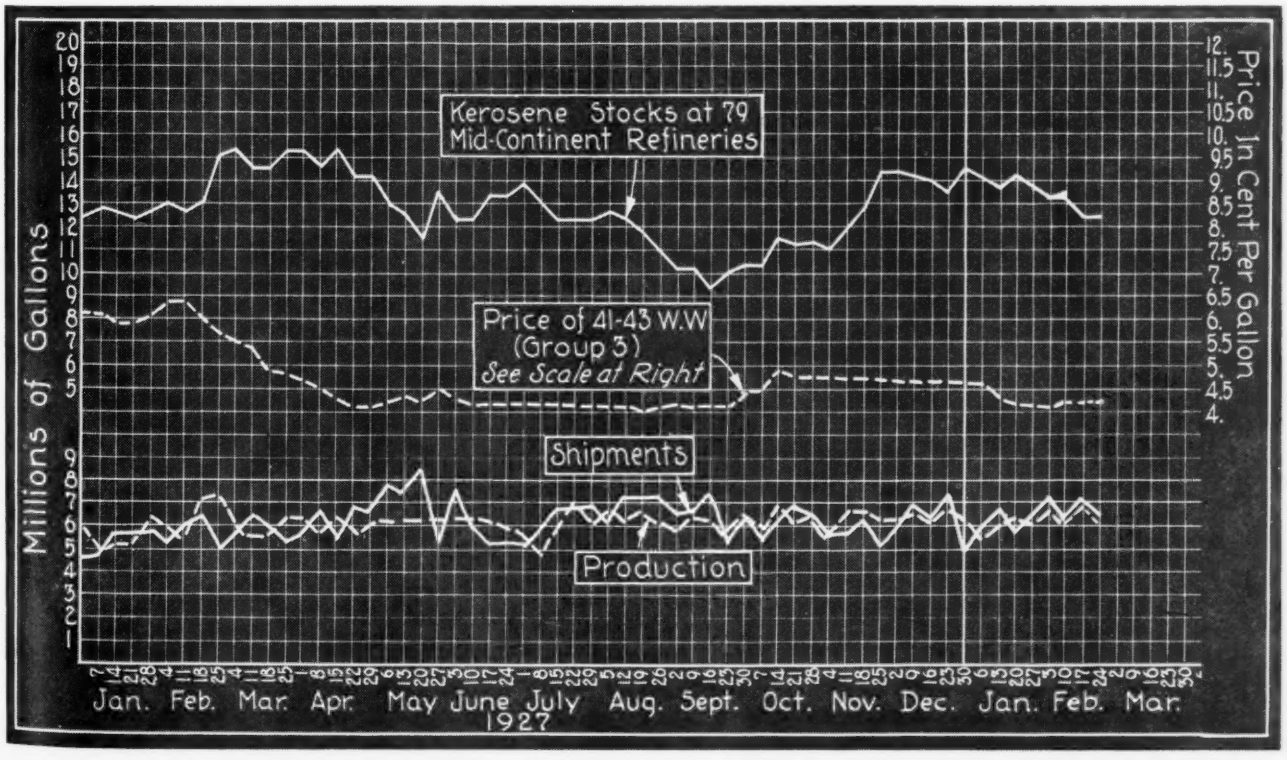
	Gallons
Production	111,168,000
Shipments	113,976,000
Net change in stocks	— 2,808,000
Ratio sales to production	102.5%

Barometer of Mid-Continent Refinery Market—Week Ending February 24

Charted Course of Prices, Production, Shipments, Stocks of Principal Refined Products, Week by Week. From Reports Made by 79 Plants to National Petroleum News

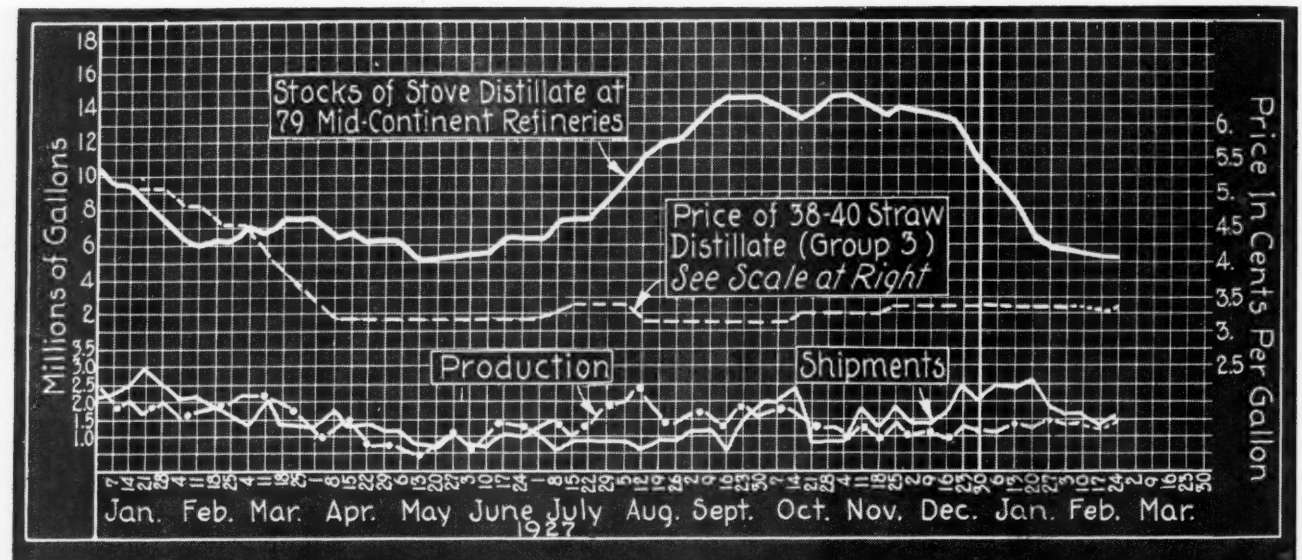


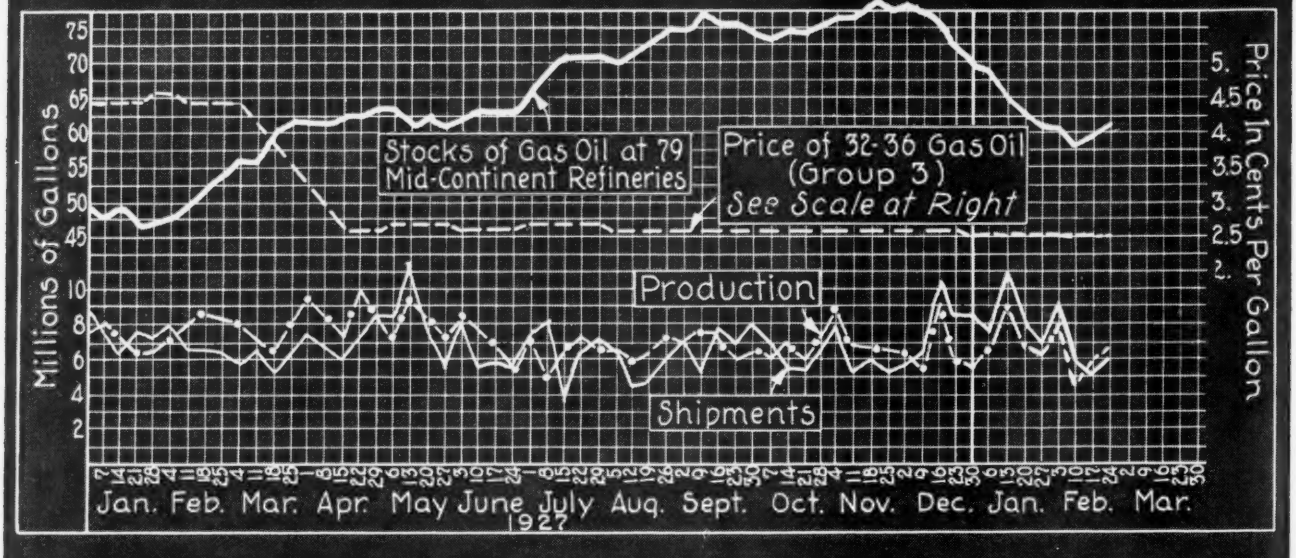
Prices shown above are extended to date shown in Refinery Market and Crude tables in Market section of this issue and stocks, shipments and Production are extended to date shown in table on opposite page

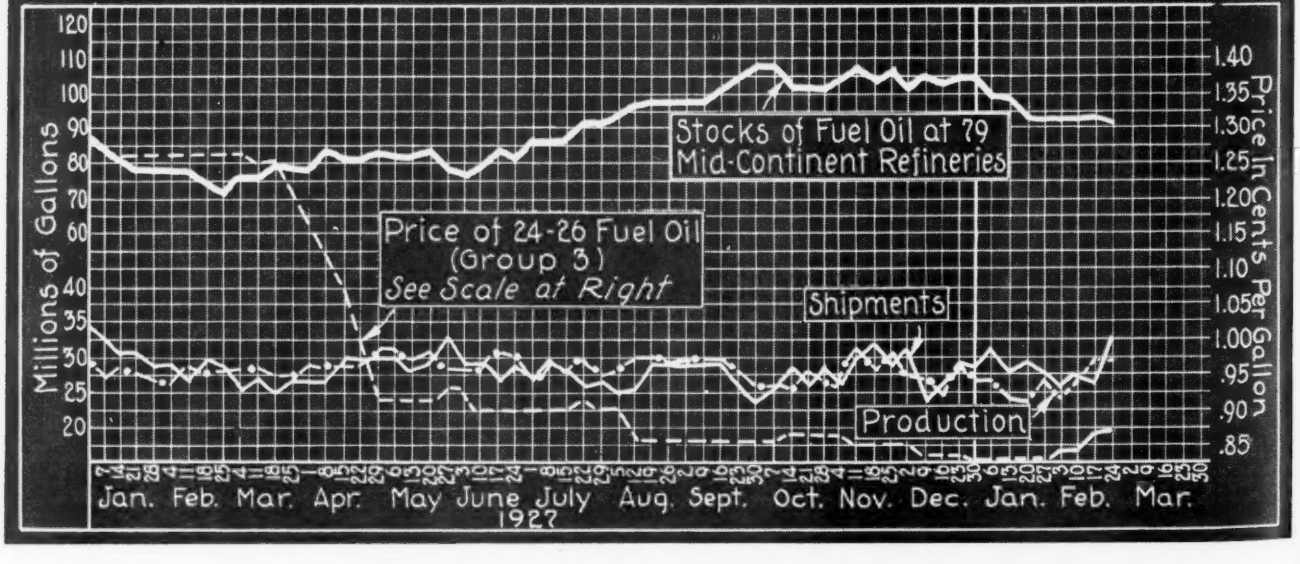


Barometer of Mid-Continent Refinery Market—Week Ending February 24

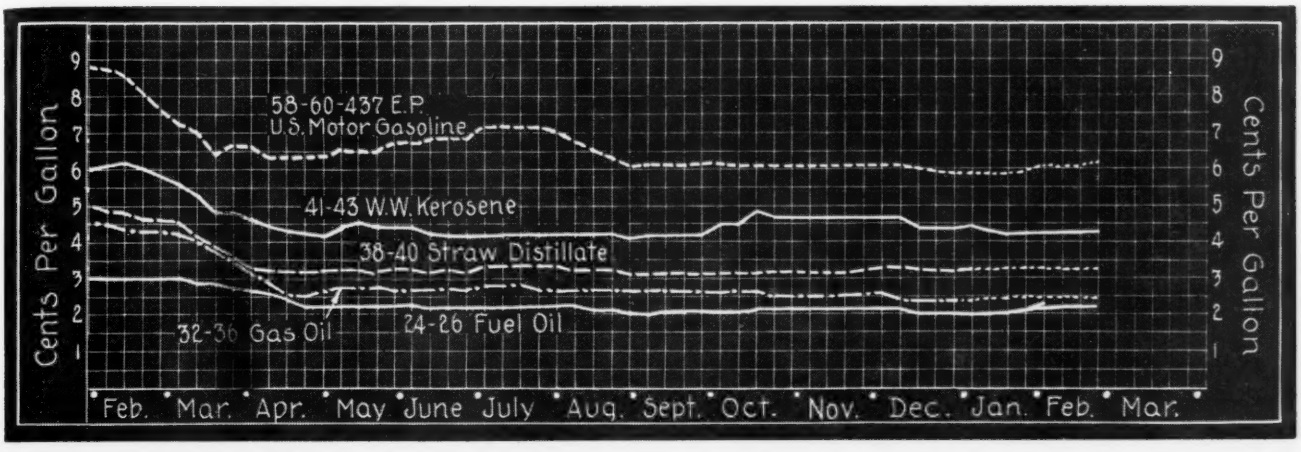
Charted Course of Prices, Production, Shipments, Stocks of Principal Refined Products, Week by Week, From Reports Made by 79 Plants to National Petroleum News


Stocks of Stove Distillate at 79 Mid-Continent Refineries
Price of 38-40 Straw Distillate (Group 3) See Scale at Right
Production
Shipments
Millions of Gallons
Price In Cents Per Gallon
Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec. Jan. Feb. Mar.
1927


Stocks of Gas Oil at 79 Mid-Continent Refineries
Price of 32-36 Gas Oil (Group 3) See Scale at Right
Production
Shipments
Millions of Gallons
Price In Cents Per Gallon
Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec. Jan. Feb. Mar.
1927


Stocks of Fuel Oil at 79 Mid-Continent Refineries
Price of 24-26 Fuel Oil (Group 3) See Scale at Right
Shipments
Production
Millions of Gallons
Price In Cents Per Gallon
Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec. Jan. Feb. Mar.
1927

Current Prices of Principal Mid-Continent Refined Products


Cents Per Gallon
58-60-437 E.P. U.S. Motor Gasoline
41-43 W.W. Kerosene
38-40 Straw Distillate
32-36 Gas Oil
24-26 Fuel Oil
Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec. Jan. Feb. Mar.

Prices shown are on Group 3 basis and extended to date shown in Refinery Market Tables Section of this Issue

increased 2,000,000 gallons about the same as the accumulation in the week ended Feb. 17. Texas shipments increased 1,300,000 gallons to 7,458,000 gallons. In Texas stocks were increased only 223,000 gallons. North Louisiana and Arkansas gasoline shipments fell 700,000 gallons and stocks were increased approximately 800,000 gallons.

Crude runs at all reporting plants were little changed. Daily average throughput of crude was 276,049 barrels, compared with 277,634 barrels the previous week. Still charges of partly refined oils were increased from 15,146 barrels a day the previous week to 17,000 barrels a day.

Kerosene shipments and production almost balanced. Production totaled 6,276,000 gallons and shipments 6,313,000 gallons. Stocks Feb. 24 were 12,761,000 gallons. In the last four weeks stocks of kerosene have been reduced 1,178,000 gallons.

Demand for home heating distillates was almost on a level with production. Reporting refiners produced 1,449,000 gallons in the week and shipped 1,525,000 gallons. Stocks were cut 76,000 gallons to 5,002,000 gallons. Production for the week was 321,000 gallons more than in the week ended Feb. 17. In the last four weeks stove distillate stocks have been reduced 671,000 gallons.

Gas oil production and shipments were not materially changed. Production totaled 6.253,000 gallons and shipments 5,123,000 gallons causing stocks to increase 1,130,000 gallons to 60,443,000 gallons. In the last four weeks stocks of gas oil have been reduced 344,000 gallons.

Shipments of fuel oil rose 5,500 000 gallons to 32,893,000 gallons. Production was almost unchanged at 29,-906,000 gallons. Reduction in stocks of 3,000,000 gallons brought total reserves at all plants to 90,379,000 gallons. In the last four weeks fuel oil stocks have been reduced 2,808,-000 gallons.

Crude and Gasoline Stocks Gain in December

NEW YORK, Feb. 25.—An increase of 3,713,000 barrels in pipe line and tank farm gross domestic crude oil stocks east of the Rockies was reported to the American Petroleum Institute during January. This compares with an increase of 2,054,000 barrels in December. January's gain was about 1,700,000 barrels more than December's.

A net increase of 2,757,000 barrels was reported in refinery stocks of all products in January at plants covering 88 per cent of the operating capacity east of California. December increase was 3,022,000 barrels.

Gasoline stocks east of California gained more in January, increase amounting to 2,602,000 barrels, as compared with increase of 2,196,000 barrels in December.

Gas and fuel oil stocks decreased 1,987,000 barrels east of California in January, compared with a decrease of 46,000 barrels in December.

Kerosene stocks fell off 33,000 barrels, compared with a decrease of 40,000 barrels in December, and lube oil stocks increased 130,000 barrels, same as in December.

Domestic crude stocks at refineries east of California increased 546,000 barrels compared with an increase of 176,000 barrels in December.

Weighted Average Prices Oklahoma Market

In line with National Petroleum News' new policy of carrying a weighted average price for the four more important Oklahoma gasolines in its market section, these weighted average prices, together with the number of cars of each grade sold, as of Monday, Feb. 27, are published below, the figures not being available for publication in the market refinery table page 131 of this issue:

	Total Cars	Weighted Average
58-60 U. S. Motor, 437 e. p.	51	6.1747
60-62, 437 e. p.	29	6.5517
60-62, 400 e.p.	11	6.7045
64-66, 375 e. p.	6	7.1041

Note: Above prices are in cents per gallon, f.o.b. Oklahoma refinery, in tank car lots.

Late Tank Wagon Changes

PHILADELPHIA, Feb. 28.—On Feb. 28 Atlantic Refining Co. advanced tank wagon and service station prices of gasoline from 1 to 2 cents generally through Massachusetts and Rhode Island. This advance makes tank wagon price 17 cents, without tax, at Providence, Boston, Worcester and Springfield, indicating an advance of 2 cents at the three former points and 1 cent at Springfield.

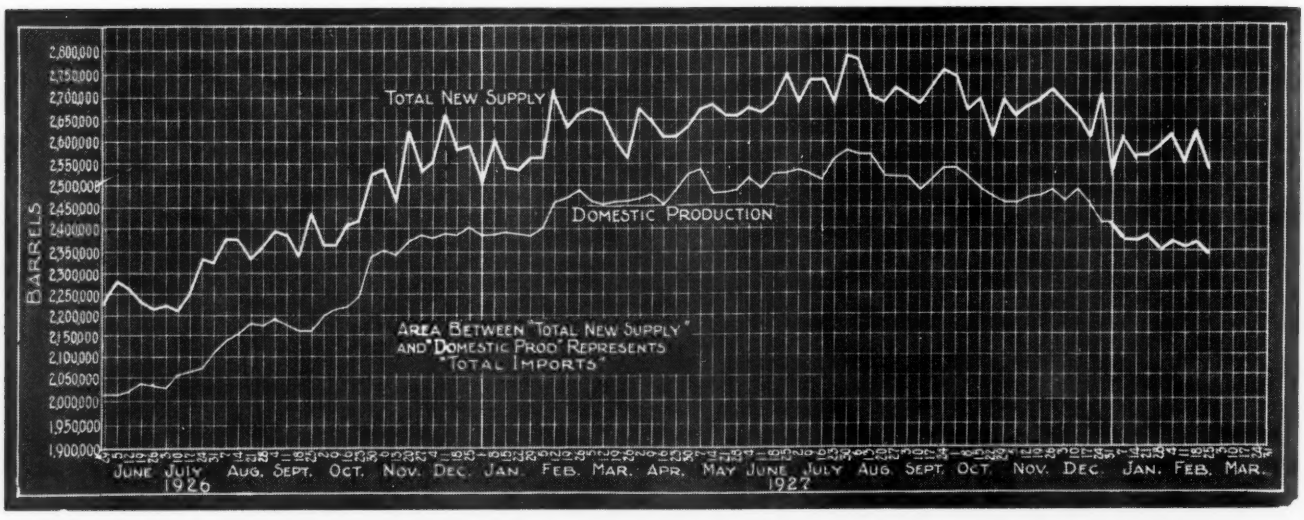
Last previous change in these two states was a 2-cent reduction on tank wagon and service station prices on April 20, 1927.

The advance at Hartford, Conn., reported on page 134 of this issue under the Atlantic Refining Co. was 2 cents, instead of 3, and prices shown in the tank wagon table on page 135 should be 20 cents, including 2-cent tax.

Acewood Elects Officers

NEW YORK, Feb. 28.—At a directors' meeting of Acewood Petroleum Corp., here on Feb. 23, these officers were elected for the coming year: A. C. Woodman, president; C. H. Longshore, vice president and treasurer; R. M. Parker, Jr., secretary, and Edward Bush, assistant secretary and assistant treasurer.

Daily Average Crude Oil Production and Imports



Daily average gross output of United States, by fields, for week ending with dates below as compiled by American Petroleum Institute

PRODUCTION SUMMARY

	Feb. 25	Feb. 18
Production east of Rockies	1,735,250	1,746,000
Decrease		10,750
Total production in U. S.	2,349,150	2,363,300
Decrease		14,150
Crude oil imports	186,286	266,286
Decrease		80,000
Total crude supply	2,535,436	2,629,586
Decrease		94,150

OKLAHOMA

	Feb. 25	Feb. 18
North Braman	3,000	3,150
South Braman	1,850	1,800
Blackwell	3,800	3,800
Hubbard	3,000	3,000
Thomas	1,450	1,500
Tonkawa	15,500	15,800
Garber	9,900	9,950
Burbank	29,500	29,550
Osage, outside Burbank	29,500	29,550
Watchorn	950	1,000
Cushing	21,200	21,000
Yale Jennings	8,900	8,950
Davenport	2,400	2,350
Bristow-Slick	24,900	24,900
North Okmulgee	15,800	15,850
Lyons-Deaner	7,600	7,700
Stroud	1,100	1,100
Cromwell	10,500	10,350
Papoose	5,250	5,350
Wewoka	8,450	8,450
Seminole	56,600	58,050
Bowlegs	88,800	92,900
Searight	18,200	18,800
Little River	33,500	34,150
Earlsboro	109,850	114,600
Duncan district	6,600	6,600
Graham	5,750	5,750
Fox	1,700	1,700
Healdton	14,350	14,400
Hewitt	8,800	8,800
Scholem Alechem	14,400	13,900
Others	80,150	79,600
Total, Oklahoma	658,700	668,100
Decrease		9,400

KANSAS

	Feb. 25	Feb. 18
Greenwood County	30,150	30,000
Florence-Covert	1,450	1,450
Peabody-Elbing	3,750	3,750
Eldorado-Towanda	14,250	14,250
Augusta-Fox-Bush	4,200	4,200
Rainbow Bend	1,850	1,650
Russell	2,950	2,900
Churchill	12,600	12,350
Oxford	14,100	14,400
Others	25,400	25,000
Total, Kansas	110,700	109,950
Increase		750

NORTH LOUISIANA

	Feb. 25	Feb. 18
Homer	4,400	4,450
Haynesville	6,400	6,400
Caddo, light	11,250	11,550
Caddo, heavy	3,900	3,950
De Soto, Red River	4,300	4,300
Elm Grove	550	550
Bellevue	1,000	1,000
Cotton Valley	4,500	4,500
Urania	7,950	7,950
Pleasant Hill	650	700
Total, North Louisiana	44,900	45,350
Decrease		450

ARKANSAS

	Feb. 25	Feb. 18
El Dorado	5,150	5,150
Champagnolle	1,100	1,250
Smackover, light	8,500	8,550
Smackover, heavy	67,700	67,950
Stephens	1,050	1,100
Nevada	1,800	1,800
Lisbon	2,350	2,350
Others	100	100
Total, Arkansas	87,750	88,250
Decrease		500

TEXAS (OUTSIDE GULF COAST)

Panhandle District

	Feb. 25	Feb. 18
Hutchinson County	46,700	46,800
Carson County	7,050	7,600
Gray County	19,050	20,800
Wheeler County	900	1,000
Others	50	50
Total, Panhandle District	73,750	76,250
Decrease		2,500

North Texas

	Feb. 25	Feb. 18
Burkburnett	12,600	12,550
Electra	11,000	11,250
Iowa Park and K-M-A	1,900	1,950
Wilbarger	10,250	10,100
Archer County	19,500	20,000
Montague-Cooke	12,700	12,950
Others	600	600
Total, North Texas	68,550	69,400
Decrease		850

West Central Texas

	Feb. 25	Feb. 18
Stephens County	7,650	7,500
Eastland-Desdemona	8,750	8,500
Brown County	12,500	13,000
Coleman County	1,450	1,500
Callahan County	3,850	3,900
Shackleford County	6,350	6,200
Young County	8,950	9,100
Throckmorton County	1,000	1,050
Palo Pinto County	500	500
Jack County	1,500	1,450
Others	500	500
Total West Central Texas	53,000	53,200
Decrease		200

West Texas

	Feb. 25	Feb. 18
Jones County	1,100	1,200
Mitchell and Scurry Counties	3,300	3,500
Howard County	4,150	5,200
Reagan County	20,000	20,500
Crane and Upton Counties	92,000	96,000
Crockett County	2,600	2,950
Pecos County	46,400	48,300
Winkler	126,000	115,600
Others	2,350	2,500
Total West Texas	297,900	295,750
Increase		2 150

East Central Texas

	Feb. 25	Feb. 18
Mexia	7,400	7,600
Currie	500	500
Richland	500	500
Wortham	1,900	1,900
Corsicana-Powell	11,800	12,000
Nigger Creek	1,400	1,600
Total, East Central Texas	23,500	24,100
Decrease		600

Southwest Texas

	Feb. 25	Feb. 18
Luling	13,950	13,250
Lytton Springs	1,600	1,600
Somerset	800	800
Laredo District	6,450	6,400
Piedras Pintas		
Dale	400	550
Others	400	400
Total, Southwest Texas	23,600	23,000
Increase		600
Total, Texas (outside Gulf Coast)	540,300	541,700
Decrease		1,400

GULF COAST

Coastal Texas

	Feb. 25	Feb. 18
West Columbia	8,000	7,550
Damon Mound	850	900
Big Creek	2,000	1,900
Boling	2,500	1,950
Blue Ridge	4,000	4,500
Pierce Junction	8,950	8,750
Humble	1,500	1,600
Goose Creek	7,300	7,350
South Liberty	2,200	2,150
Hull	11,500	11,600
Saratoga	1,050	1,050
Batson	1,350	1,350
Barber's Hill	650	650
Sour Lake	3,400	3,650
Spindletop	36,700	36,600
Orange County	4,650	4,400
Others	2,500	3,000
Total, Coastal Texas	99,100	98,950
Increase		150

Coastal Louisiana

	Feb. 25	Feb. 18
Vinton	4,600	4,600
Lockport	4,700	4,750
Evangeline	1,000	1,150
Edgerly	1,500	1,750
Others	3,600	2,250
Total, Coastal Louisiana	15,400	14,500
Increase		900
Total Gulf Coast	114,500	113,450
Increase		1,0

ROCKY MOUNTAIN

Wyoming

	Feb. 25	Feb. 18
Salt Creek	37,300	38,500
Grass Creek	2,400	2,500
Elk Basin	1,050	1,150
Big Muddy	2,700	2,750
Lost Soldier	3,200	2,750
Rock River	2,750	2,700
Lance Creek	600	650
Teapot Dome		
Others	3,600	3,350
Total, Wyoming	53,600	54,350
Decrease		750

Montana

	Feb. 25	Feb. 18
Cat Creek	1,800	1,80
Sunburst	9,000	8,50
Others	150	1
Total, Montana	10,950	10,45
Increase		500

Colorado

	Feb. 25	Feb. 18
Moffatt (Craig)	1,200	1,300
Fort Collins	3,150	3,050
Florence	1,150	1,100
Others	2,300	2,050
Total, Colorado	7,800	7,500
Increase		300

New Mexico

	Feb. 25	Feb. 18
Table Mesa	250	350
Artesia	1,250	1,250
Hogback	500	550
Rattlesnake	300	
Others	250	250
Total, New Mexico	2,550	2,400
Increase		150
Total, Rocky Mountain	74,900	74,700
Increase		200

CALIFORNIA

	Feb. 25	Feb. 18
Santa Fe Springs	38,000	38,000
Long Beach	116,500	118,000
Huntington Beach	58,500	60,000
Torrance	19,500	19,800
Dominguez	12,500	12,800
Rosecrans	7,500	7,500
Inglewood	30,500	30,500
Midway-Sunset	79,500	79,500
Ventura Avenue	54,500	54,000
Seal Beach	39,500	39,800
Others	157,400	157,400
Total, California	613,900	617,300
Decrease		3,400

EASTERN

	Feb. 25	Feb. 18
(Including Ill., Ind., Ky., Ohio, W. Va., Pa. and N. Y.)	103,500	104,500
Decrease		1,000

"Advance" in Oil Prices Fails to Stir Operators to Drilling

By Lawrence E. Smith
N. P. N. STAFF WRITER

TULSA, Feb. 25

IT HAS now been established that the revised schedule of prices on Mid-Continent oil is a slight advance, but so slight that little comfort can be derived from it. For a day or so after the Carter Oil Co. led off with a revision of the gravity schedule price posting, widening differentials from the old 2 cents per degree to 5 cents on the low end of the scale and to 3 cents from the 36-36.9 degree point upward, there was much discussion as to what it all meant.

It is probably the first recorded instance of a change in prices that left the industry confused as to whether it was an advance or a cut.

What was aimed at, of course, was the reduction of the low gravity oils in such a way as to leave the average price comparatively unchanged and the analysts who devised the new schedule succeeded admirably. It amounts, as a matter of fact, on Oklahoma crude oil to a raise of about 1.9 cents per barrel—on average gravity.

In practical terms it means that a lot of producers got reductions in price from 1 to 36 cents per barrel and others got increases from 1 to 14 cents. Probably more producers will get smaller checks than will get larger ones at the next pipe line payment date. The southern Oklahoma operators are adversely affected in a substantial way, as are many of those in north Texas and in Kansas.

Inventory values for the purchasing companies of crude oil are generally scaled downward. The lower gravity oils bought by those who purchase generally, such as the Prairie and the Sinclair, are stored when it is necessary to store anything and the lighter oils are moved to refineries as quickly as possible. The average of most of the companies' stocks falls below the points where the old and new prices meet.

With winter's end near and a consequent weakening in fuel oil demand tied in with the rush of crude oil of the fuel grade—west Texas and Venezuela, the latter in process of considerable increase—the low gravity oils suffered and the lighter ones didn't gain much.

THAT operators are not roused to a high point in enthusiasm by the revision, regardless of the interpretations made by local newspapers, is indicated by the willingness of those in the Seminole district to keep the restrictive policy in effect.

While the agreement on the area south of Little River expires March 1 and certain offset requirements on some of the wells make it impossible to prolong it, the operators are getting into another agreement to test a large amount of territory without going into the old style intensive campaign. This agreement, described at length in another column, shows the spirit which today permeates the corporate breasts. Nobody wants to see another Seminole rush and they are all willing to make some concessions to hold it back.

DEVELOPMENT news of the past week had two outstanding items. One had to do with Logan county, Okla., where 6,000-foot drilling is the hard task of the participating companies. Again the Roxana Petroleum Corp. scored. This company got the first Wilcox sand producer in the county last June, in 30-19N-4W. During the past week the No. 1 Freelove, in the SW of 17-19-4 topped the Wilcox at 6080 feet and was drilled to total depth of 6092 at which point it made 2352 barrels in the 24 hours ended Friday morning.

It is an extension of one and three quarters miles to the north of the Wilcox sand pool, which theretofore consisted of one true Wilcox well and two others immediately southwest producing from the Simpson formation and one about midway between the discovery and the Freelove, also producing from the Wilcox but in much smaller quantity than either the discovery or the Freelove.

There is nothing more due in this territory for several weeks. The

Drilling Operations in Oklahoma, Kansas and Texas, Week Ended February 25, 1928

	Feb. 25 Week Ended					Feb. 18				
	Loc.	Rigs	Drg.	S.D.	Total	Loc.	Rigs	Drg.	S.D.	Total
OKLAHOMA										
Burbank	1	6	34	..	41	..	5	37	2	44
Other Osage	4	5	21	1	31	2	4	25	1	32
Bristow-Cushing	5	6	37	9	57	4	7	39	9	59
North Oklahoma	10	9	70	37	126	9	10	74	32	125
South Oklahoma	6	19	130	29	184	7	18	123	30	178
Muskogee	..	5	43	14	62	..	6	44	18	68
Okmulgee-Bristow	14	38	71	19	142	13	32	76	18	139
Seminole Dist.	13	34	139	13	199	11	30	146	19	206
Total Oklahoma	53	122	545	122	842	46	112	564	129	851
KANSAS	43	65	127	74	309	32	52	134	62	280

	Feb. 25 Week Ended					Feb. 18				
	Loc.	Rigs	Drg.	S.D.	Total	Loc.	Rigs	Drg.	S.D.	Total
TEXAS										
Central	..	100	198	152	450	..	137	210	134	481
Panhandle	..	58	102	66	226	..	64	109	62	235
N. Central	..	50	90	27	167	..	47	84	29	160
West	..	123	206	148	477	..	109	221	135	465
Laredo	..	1	25	19	45	..	1	25	19	45
Total Texas	..	332	621	412	1,365	..	358	649	379	1,396
New Mexico	..	4	16	24	44	...	2	18	26	46
GRAND TOTAL	96	523	1,309	632	2,560	78	524	1,365	596	2,563

Completions in North Louisiana and Arkansas, Week Ended February 23, 1928

Louisiana—Webster Parish—Spring Hill

Company	Well	Location	Depth	Yield
Magnolia Pet. Co.	Munn No. 1	29-23-9	2709	10M gas
Bossier Parish—Cartersville				
Bahan & Davis	Holmes No. 1	36-23-12	3078	40M gas
Texas Company	Peyton No. 1	30-23-11	3067	40M gas
Caddo Parish—Pine Island				
Standard Oil Co.	J. J. Hart No. 18	34-21-16	1835	50 Bbls.
Superior Oil Co.	Youree No. 8	26-20-15	2320	10 Bbls.
DeSoto Parish—Pleasant Hill				
Foster et al.	Johnson No. 1	7-10-12	3210	dry, abandoned
Ouachita Parish—Monroe				
Ouachita Nat. Gas Company	Smith No. 8	37-20-4E	2100	20M gas
Moody & Seagraves	U. S. Gov. No. 1	1-19-3E	2177	5M gas

Richland Parish

Company	Well	Location	Depth	Yield
Ruston Drlg. Co.	Sartor No. 1	17-16-6E	2445	56M gas
LaSalle Parish—Little Creek				
Wingfield et al.	Gibson No. 2	2-9-1E	3073	salt water, abd.
East Texas—Waskom—Harrison County				
Magnolia Pet Co.	Vincent No. 1	Bedford HRS	1910	3M gas.
Panola County				
Magnolia Pet. Co.	Ella Baker No. 3	B. C. Jordan HRS	985	3M gas
Arkansas—Champagnolle—Union Co.				
E. M. Jones	Crain No. 3	2-17-14	4015	salt water, abnd.
Smackover				
Lion O. & R. Co.	Leverette No. 1	11-16-16	2770	salt water, abnd.

Seminole District Production by Companies and Leases, February 24 and February 17, 1928

BOWLEGS

Company	Farm	S.T.R.	Feb. 24 Wells	Feb. 24 Prod.	Feb. 17 Wells	Feb. 17 Prod.
Amerada	Rascoe	15– 8–6	8	2,395	2	2,810
Atlantic	Baker	1– 8–6	4	650	4	689
Atlantic	Fleet	23– 8–6	4	515	4	632
Atlantic	Grayson	21– 8–6	3	984	3	1,069
Atlantic	A. Jones	10– 8–6	3	117	3	120
Atlantic	C. Jones	9– 8–6	2	214	2	357
Total Atlantic			16	2,480	16	2,967
Barnsdall	McNac	28– 8–6	1	30	1	30
Barnsdall	Murrow	11– 8–6	4	676	4	880
Total Barnsdall			5	696	5	910
Carter	Bowlegs	15– 8–6	4	1,150	4	1,345
Carter	Burden	23– 8–6	3	330	3	345
Carter	Harjoche	15– 8–6	6	695	6	715
Carter	Hilly	23– 8–6	3	995	3	1,045
Carter	Jones	11– 8–6	4	1,720	4	1,780
Carter	McGeisey	21– 8–6	1	20	1	30
Carter	Melisse	9– 8–6	1	285	1	400
Carter	Walker	15– 8–6	4	655	4	735
Carter	Wise	23– 8–6	12	3,810	12	4,060
Total Carter			34	9,660	34	10,460
Empire	Lacey	15– 8–6	6	603	6	683
Empire	Wise	23– 8–6	2	562	2	632
Total Empire			8	1,165	8	1,315
Gypsy	Bowlegs	22– 8–6	1	167	0	0
Gypsy	Bradley	8– 8–6	1	5	1	10
Gypsy	Cumsey	8– 8–6	4	1,707	4	1,877
Gypsy	Dosar	7– 8–6	1	100	1	100
Gypsy	Grayson	13– 8–6	4	1,127	4	765
Gypsy	Harjoche	10– 8–6	2	1,232	1	830
Gypsy	Henderson		1	62	1	510
Gypsy	Jones	11– 8–6	1	360	1	345
Gypsy	Walker	15– 8–6	8	1,960	8	2,359
Gypsy	Wise	23– 8–6	3	75	3	377
Total Gypsy			26	6,795	25	7,173
I. T. I. O.	Barnett-A	24– 8–6	2	355	2	334
I. T. I. O.	Barnett-B	24– 8–6	1	275	2	242
I. T. I. O.	Billington	22– 8–6	5	683	5	969
I. T. I. O.	Bowlegs	22– 8–6	11	1,550	11	1,601
I. T. I. O.	Davis	13– 8–6	4	1,135	4	1,318
I. T. I. O.	Fay	18– 8–6	9	2,626	9	2,803
I. T. I. O.	Goforth	15– 8–6	12	1,873	11	1,569
I. T. I. O.	Livingston	15– 8–6	11	3,966	11	4,083
I. T. I. O.	Lizzie	11– 8–6	2	592	2	611
I. T. I. O.	Walker	15– 8–6	8	1,044	8	1,065
I. T. I. O.	Wilmont	15– 8–6	4	888	4	907
I. T. I. O.	Work		2	135	1	145
I. T. I. O.	Youngblood	22– 8–6	2	285	2	215
Total I. T. I. O.			74	15,052	72	15,862
McCulloch	Bowlegs	22– 8–6	3	390	3	370
Magnolia	Davis-BF	13– 8–6	2	703	1	682
Magnolia	Davis-M	13– 8–6	1	339	1	335
Magnolia	Hammond	10– 8–6	3	480	2	140
Magnolia	Rhodes	10– 8–6	2	4,808	8	5,413
Magnolia	Van Buskirk	9– 8–6	1	258	1	315
Total Magnolia			15	6,588	13	6,849
Mid-Continent	Baker	10– 8–6	4	1,700	4	1,798
Mid-Continent	Bowlegs	22– 8–6	1	45	1	25
Mid-Continent	Smith	12– 8–6	6	720	6	755
Total Mid-Continent			12	2,466	12	2,579
Minnehoma	Bowlegs	15– 8–6	3	305	3	260
Prairie	Gahagan	23– 8–6	4	390	4	680
Prairie	Harber	10– 8–6	8	3,525	8	3,865
Prairie	Jones	11– 8–6	4	475	4	555
Prairie	Templeton	12– 8–6	5	3,090	4	3,180
Prairie	Whitney	23– 8–6	4	465	4	555
Total Prairie			25	7,945	24	8,835
Pure	Reed	14– 8–6	15	3,487	15	3,479
Pure	Strother-D	14– 8–6	4	608	4	729
Pure	Strother-F	10– 8–6	3	1,013	3	580
Total Pure			22	5,108	22	4,788
Roxana	Taylor	16– 8–6	5	1,145	6	1,292
Shaffer	Lacey	14– 8–6	3	540	3	565
Sinclair	Bowlegs	22– 8–6	1	60	1	35
Sinclair	Cumsey	10– 8–6	4	5,500	4	5,817
Sinclair	Ellen	11– 8–6	7	1,712	5	1,684
Sinclair	Harjo	14– 8–6	3	790	3	885
Sinclair	Jones	8– 8–6	6	4,340	6	4,715
Sinclair	Taylor-M	10– 8–6	4	3,053	4	3,189
Sinclair	Taylor-W	10– 8–6	1	1,692	0	0
Sinclair	Walker	22– 8–6	4	775	5	2,669
Total Sinclair			30	17,924	29	18,994
Texas	Reed	14– 8–6	11	2,825	11	3,285
Tidal	Grayson	13– 8–6	3	1,105	3	1,165
Tidal	Harjoche	10– 8–6	6	2,230	6	2,630
Total Tidal			9	3,335	9	3,795
Twin State	Jones	10– 8–6	2	53	2	5
TOTAL BOWLEGS			310	87,230	308	92,649

LITTLE RIVER

Company	Farm	S.T.R.	Feb. 24 Wells	Feb. 24 Prod.	Feb. 17 Wells	Feb. 17 Prod.
Amerada	Fore	35– 8–6	2	1,075	2	1,026
Amerada	Nitey	35– 8–6	3	3,005	3	2,925
Total Amerada			5	4,080	5	3,950
Barnsdall	Hotulke	22– 7–6	1	30	1	66
Blackwell	Nitey	35– 8–6	7	2,648	7	2,911
Carter	Fish	1– 7–6	5	1,930	5	1,905
Carter	Jackson	11– 8–6	1	100	1	100
Total Carter			6	2,030	6	2,005
Continental[1]	Cosar	2– 7–6	2	405	2	875
Gypsy	Brown	33– 8–6	1	50	1	50
Gypsy	Campbell	36– 8–6	2	27	1	50
Gypsy	Nungee	36– 8–6	1	45	2	190
Gypsy	Pottey	35– 8–6	3	450	3	572
Total Gypsy			7	572	7	857
Independent	Harris	23– 7–6	1	108	1	104
Indep. et al.	Davis	2– 7–6	1	1,880	1	2,020
Total Independent			2	1,988	2	2,124
I. T. I. O.	Campbell	1– 7–6	1	124	1	152
I. T. I. O.	Dungan	35– 8–6	3	2,706	3	2,663
I. T. I. O.	House-MA	1– 7–6	1	243	1	217
I. T. I. O.	A-House-WE	1– 7–6	1	65	1	38
I. T. I. O.	B-House-WE	2– 7–6	3	1,733	3	1,700
I. T. I. O.	Jackson	1– 7–6	3	2,248	3	2,227
I. T. I. O.	McCulla	1– 7–6	3	1,000	3	1,026
I. T. I. O.	Nitey	2– 7–6	7	1,678	7	1,537
I. T. I. O.	Phoebe-A	36– 8–6	3	812	3	790
I. T. I. O.	Phoebe-B	36– 8–6	4	441	3	447
I. T. I. O.	Reed	1– 7–6	1	148	1	46
I. T. I. O.	Hull	26– 8–6	1	118	1	124
I. T. I. O.	Sotkneche	1– 7–6	4	963	4	1,016
Total I. T. I. O.			35	12,279	34	11,938
Magnolia	Cruse	2– 7–6	1	651	1	720
Magnolia	Pottey	35– 8–6	2	468	2	512
Total Magnolia			3	1,119	3	1,232
Mid-Continent	Wadsworth	26– 8–6	7	1,070	7	1,080
Mid-Continent	Smith	12– 8–6	1	40	1	40
Total Mid-Continent			8	1,110	8	1,120
Pine et al.	Pottey	35– 8–6	2	1,242	2	1,043
P & R.	Dungan	35– 8–6	2	0	2	120
P & R.	House	2– 7–6	4	2,085	4	2,215
Total P & R.			6	2,085	6	2,335
Roxana	Smith	1– 7–6	1	5	1	10
Sinclair	Cosar	36– 8–6	2	1,770	2	1,630
Snowden et al.	Tiger	13– 7–6	1	0	1	87
Superior	Wadsworth	1– 7–6	1	18	1	18
Texas	Coker	1– 7–6	3	625	3	625
Tidal	House	1– 7–6	3	1,335	3	1,575
Tidal	Johnson	1– 7–6	1	70	1	75
Total Tidal			4	1,405	4	1,650
TOTAL LITTLE RIVER			97	33,451	97	34,514

EARLSBORO

Company	Farm	S.T.R.	Feb. 24 Wells	Feb. 24 Prod.	Feb. 17 Wells	Feb. 17 Prod.
Amerada	Anderson	15– 9–5	2	1,445	3	1,165
Amerada	Cowden	4– 9–5	8	1,940	8	2,085
Amerada	Rodgers	3– 9–5	3	1,350	3	1,835
Total Amerada			13	4,735	14	5,085
Barnsdall	Brown	10– 9–5	4	1,673	4	1,946
Barnsdall	Bruner-F	2– 9–5	2	1,010	2	1,001
Barnsdall	Bruner-N	11– 9–5	4	1,608	4	1,478
Barnsdall	Cudjo	11– 9–5	1	26	1	27
Barnsdall	Davis-D	11– 9–5	3	1,968	3	1,685
Barnsdall	Davis-J	11– 9–5	4	730	4	817
Barnsdall	Gibson	9– 9–5	8	3,346	8	2,097
Barnsdall	Hearn	15– 9–5	1	6	1	5
Barnsdall	Ingram	4– 9–5	7	5,263	7	5,893
Barnsdall	Pack	10– 9–5	4	198	4	191
Barnsdall	Peter	10– 9–5	4	324	4	461
Barnsdall	Sango	2– 9–5	3	7,019	3	7,041
Barnsdall	Sebolka	15– 9–5	1	815	1	799
Barnsdall	Sullivan	10– 9–5	2	17	2	30
Barnsdall	Watsuke	12– 9–5	4	1,861	4	1,259
Total Barnsdall			57	26,092	57	24,875
Carter	Davis	13– 9–5	1	570	1	40
Carter	Payne	12– 9–5	3	140	3	175
Carter	Sango	2– 9–5	4	3,395	4	3,005
Total Carter			8	4,085	8	4,220
Continental	Kays	2– 9–5	2	240	2	405
Continental	Spencer	12– 9–5	4	665	4	1,290
Total Continental			6	905	6	1,695
Empire	Barker	12– 9–5	1	1,497	1	1,722
Empire	Edmundson	3– 9–5	3	1,213	3	1,207
Total Empire			4	2,710	4	2,929
Gypsy	Bruner	10– 9–5	4	1,840	4	2,062
Gypsy	Carter	11– 9–5	10	3,602	10	3,980
Gypsy	Earl	16– 9–5	1	15	1	20
Gypsy	Hunick	5– 9–5	1	2,190	1	2,265
Gypsy	McFarland		1	0	1	12
Gypsy	Noble	12– 9–5	4	4,002	4	4,105
Gypsy	Peter	10– 9–5	6	152	6	225
Gypsy	Sango	1– 9–5	5	4,737	5	4,907
Gypsy	State	16– 9–5	4	1,197	4	1,257
Total Gypsy			36	17,736	36	18,833
Independent	Bruner	10– 9–5	4	145	4	165
Independent	Gaines	11– 9–5	4	980	4	1,380
Independent	Knapp	8– 9–5	6	2,459	6	2,440
Independent	O'Dell	4– 9–5	4	25	4	0
Independent	Sullivan	10– 9–5	4	18	4	107
Total Independent			22	3,627	22	4,092
Magnolia	Bryant	9– 9–5	6	2,642	6	1,987
Magnolia	Cowden	4– 9–5	4	65	4	56
Magnolia	Edmundson	3– 9–5	3	42	3	42
Magnolia	Holmsley	11– 9–5	8	1,854	8	2,194
Magnolia	Ingram	10– 9–5	1	30	1	30
Magnolia	Lena	10– 9–5	3	78	3	83

(*Continued on Page 43*)

Seminole District Production by Companies and Leases, February 24 and February 17, 1928

(*Continued from Page 42*)

Company	Farm	S.T.R.	Feb. 24 Wells	Feb. 24 Prod.	Feb. 17 Wells	Feb. 17 Prod.
Magnolia	Seay	12- 9-5	9	5,315	9	5,602
Magnolia	Simpson	10- 9-5	4	313	4	294
Magnolia	Sparks	11- 9-5	7	2,349	7	2,837
Magnolia	Sullivan	12- 9-5	3	113	3	129
Total Magnolia			51	12,801	51	13,254
Mid-Continent	McCumber	9- 9-5	7	325	7	385
Mid-Kansas	Anderson	14- 9-5	4	210	4	225
Phillips	Dunnaway	15- 9-5	1	20	1	45
Phillips	Graham	9- 9-5	4	330	4	227
Total Phillips			5	350	5	272
Prairie	Baker	23- 9-5	1	50	1	50
Prairie	Davis	13- 9-5	4	5,035	4	6,735
Prairie	Graham-C	3- 9-5	2	45	2	25
Prairie	Graham-O	10- 9-5	4	2,585	4	1,660
Prairie	Stidham	11- 9-5	13	3,825	13	4,180
Total Prairie			24	11,540	24	12,650
Roxana	Bayliss	17- 9-5	1	14	1	14
Roxana	Spencer	12- 9-5	2	1,802	2	2,051
Total Roxana			3	1,816	3	2,065
Shaffer	Clark	1- 9-5	5	1,141	5	1,102
Sinclair	Foreman	18- 9-5	1	15	1	15
Sinclair	Hollins	12- 9-5	3	325	3	215
Sinclair	Sango	2- 9-5	2	3,740	2	4,505
Total Sinclair			6	4,080	6	4,735
Skelly	Spencer	12- 9-5	1	706	1	730
Texas	Anderson	2- 9-5	6	825	6	715
Texas	Brown	10- 9-5	8	2,690	8	2,565
Texas	Rodgers	5- 9-5	4	4,035	4	4,705
Texas	Wilmont	10- 9-5	6	2,985	6	3,325
Total Texas			24	11,535	24	11,310
Tidal	Watkins	9- 9-5	8	3,070	8	2,895
Twin State	Barker	12- 9-5	3	65	3	135
Twin State	Hearn	2- 9-5	4	3,095	4	3,045
Total Twin State			7	3,160	7	3,180
TOTAL EARLSBORO			290	110,740	289	113,685
TOTAL LITTLE RIVER			97	33,451	97	34,514
TOTAL SEARIGHT			71	17,783	71	18,994
TOTAL BOWLEGS			310	87,230	308	92,649
TOTAL SEMINOLE			314	55,985	314	57,093
GRAND TOTAL SEMINOLE AREA			1,084	305,189	1,081	316,835
Avg. per well				281		293

Completions in N.E. Central, West, Panhandle and North Texas, Week Ended February 25, 1928

NORTH AND EAST CENTRAL

Brown County

Company	Well No. Farm	Location Survey	Depth	Init. Prod.
Pandem	3-Curry	Betts	1097-1110	20
Pandem	2-Hutton	Nobles	1115-1127	75
Richards	2-Curry	Betts	1097-1107	30
Syndicate	2-Curry	Betts	1106-1125	30
Miller	1-Alcorn	Honeycutt	1137-1142	10
Buffalo	1-Brown	Kenney	1096-1102	240
Nat. Gas & Fuel	2-Capps	Hunt	1569-1614	.3M
Texas	1-Kennedy	BBB&C	T.D. 3055	Dry
Mexana	1-Lowe	Maker	T.D. 1428	Dry
Snider et al.	1-Bayson	William	T.D. 1275	Dry
Taylor et al.	1-Lewis	Kenny	T.D. 1173	Dry
Gilman et al.	1-Baugh	Lockmier	T.D. 2040	Dry

Callahan County

Garner et al.	1-Hatchett	D&DA	T.D. 812	Dry

Coleman County

Roxana	1-Gracey	....	T.D. 500	Dry
Gwinnup et al.	1-Morris	Cochran	1988-2000	42
Eastland	1-Morris	Webber	1997-2002	276
Roth et al.	1-Stevens	Coleman	1054-1065	190

Eastland County

Teatsorth et al.	1-Bourland	Robinson	3105-3108	20
McLester et al.	2-Thorpe	Sarter	3678-3685	300
McLester et al.	5-Thorpe	Stubblefield	3486-3681	552&2M
Root et al.	2-Thorpe	H&TC	3614-3619	1320
Mook Texas	2-Casey	Van Norman	3020-3031	8M
Keudell et al.	1-Collins	H&TC	T.D. 1451	Dry
Independent	1-Been	Grigsby	T.D. 3685	Dry

NORTH TEXAS

Archer County

Gohlke et al.	1-Parrish	Geraldine	1552-1554	42
Bridwell	1-Burns	Harris	1504-1513	22
Roberts	5-Garvey	TE&L	757-771	25
Gerbin et al.	1-Waggoner	H&TC	T.D. 1911	Dry
Gulf Prod.	1-Netherton	ATNCL	T.D. 1605	Dry
Humble	1-Wilson	ATNCL	T.D. 1544	Dry
Kelleher et al.	1-Andrews	Glass	T.D. 1528	Dry
Gulf Prod.	1-Taber	DCSL	T.D. 1551	Dry
Panhandle	2-Garvey	TE&L	T.D. 525	Dry

Cooke County

Benton et al.	1-Martin	Olabarri	T.D. 2327	Dry

Wichita County

Magnolia	12-Watkins	KWVFL	T.D. 1982	Dry

Wilbarger County

Consolidated	1-Waggoner	H&TC	T.D. 2404	Dry
Milham	3-Waggoner	H&TC	T.D. 2223	Dry
Golding et al.	1-Wharton	H&TC	T.D. 2785	Dry
Fain et al.	2-Waggoner	H&TC	2358-2375	109

Young County

Company	Well No. Farm	Location Survey	Depth	Init. Prod.
Allday	1-Johnson	Sargent	570-588	35
Wolfe	1-Lowe	TE&L	841-843	8
Benson	1-Benson	TE&L	T.D. 1006	Dry
Pennell et al.	1-McKinley	TE&L	T.D. 1849	Dry
Parket et al.	1-Newman	Sallie	T.D. 650	Dry

PANHANDLE

Gray County

Gulf Prod.	2-Bowers	H&GN	3025-3030	35
Skelly	1-Jackson	H&GN	2365-2370	50
Texas	4-Saunders	Eustis	2725-2740	663
Shamrock et al.	1-Beck	H&GN	2145-2355	20M

Hutchinson County

Skyrocket	1-Jamison et al.	....	T.D. 3140	25
Beal et al.	1-Johnson	A&B	2830-2875	157

WEST TEXAS

Crane County

Tidal	3-Univ.	Univ.	2805-2952	3200 (13 hrs.)

Gaines County

Westeimer et al.	1-Forbes	CSL	T.D. 5341	Dry

Pecos County

Anderson et al.	1-Sherbino Bros.	GC&SF	T.D. 2700	Dry
Henshaw	1-Corder	CCSD&R	T.D. 2517	Dry
McMann	2-Richardson	TC	1305-1395	20 (1 hr.)
Humble	4-Smith	TC	194-1522	87 (1 hr.)
California	10-Smith	TC	1496-1572	194 (1 hr.)
California	9-Yates	TC	1235-1330	4052 (8½ hrs.)
California	10-Yates	TC	T.D. 1030	75 (1 hr. & 25M)
California	11-Yates	TC	1258-1426	225 (1 hr.)
California	12-Yates	TC	1203-1290	1330 (1 hr.)
California	9-Smith	TC	1258-1470	108 (1 hr.)
Mid-Kansas et al.	8-Smith et al.	TC	1240-1368	2297 (15 hrs.)
Allsman et al.	10-State	Pecos River	T.D. 1060	75 (1 hr.)
Mid-Kansas et al.	20-Yates	I&GN	1155-1308	300 (1 hr.)

Winkler County

Atlantic	1-Hendricks	PSL	2670-2793	5342
Independent	1-Vardeman	PSL	2575-2743	4596
Southern Crude	67-Hendricks	PSL	3015-3085	1055
Humble	2-Hendricks	PSL	2968-3010	3122
Magnolia	4-Hendricks	PSL	2885-2888	3255
Pure	2-Hendricks	PSL	2650-3889	305
Roxana	1-Hendricks	PSL	3068-3072	1192
Roxana	2-Hendricks	PSL	2995-3053	1270
Roxana	4-Hendricks	PSL	2952-2970	4434
Turman et al.	1-Hendricks	PSL	2879-3045	1577
Southern Crude	88-Hendricks	PSL	2885-3051	350

south offset to the new well is being drilled by the Twin State Oil Co. It has set 8-inch at 4,701 feet. The southwest offset to the Freelove is a gas well at the 4,800-foot level, drilled by the Sinclair Oil & Gas Co.

Gravity of the oil from the new well is like that of the discovery, 41-42. Roxana's production in this field now exceeds 5,000 barrels daily, as the discovery well is making better than 2,000 barrels, and is about the capacity of the 4-inch pipe line which runs north to Garber. It is reported that a new line, either a 6 or an 8-inch, will be laid soon.

With the exception of the east extensions to the Burbank field it has been a long time since the Osage country had a thrilling wildcat. Late in the week it appeared that one had arrived. Kay County Gas Co. (Marland), in the NE SW of 22-24-7E, had been swabbing and flowing from 315 to 375 barrels daily from the Siliceous lime (pre-Wilcox) horizon topped at 2834 feet. The well was deepened to 2899 feet and flowed 250 barrels in 2 hours.

This is about 5 miles east of the little Osage town, Gray Horse, and is upward of 15 miles southeast of the southern tip of the Burbank field. It is more than 5 miles from nearest production and is in an area which has had little testing. The well is on a so-called naval reserve, over which the navy has no control, being merely a tract which the Osages generously set aside during the war

Completions in Oklahoma and Kansas, Week Ended February 25, 1928

OKLAHOMA

Carter County

Company	Well No.	Location	Depth	Init. Prod.
Magnolia	2	SWc SE SW 14-1-3 W	2365-2415	181

Creek County

Company	Well No.	Location	Depth	Init. Prod.
Gled	2	SWc NE NE NW 24-19-8 E	2225-2259	30
Bartlett	1	NEc NW NW 28-18-9 E	2620-2636	15
Winemiller	1	SEc NW 4-17-11 E	1526-1567	275
Chief Drlg	1	SEc 1-17-10 E	T.D. 2868	Dry
I. & D.	2	SEc NE NE 23-17-10 E	T.D. 2550	Dry
Henlock	1	NWc NE SW 35-18-10 E	T.D. 2497	Dry
Wilson	1	NEc NW 10-15-8 E	T.D. 3241	Dry

Grady County

Company	Well No.	Location	Depth	Init. Prod.
Okla. Gas	4	NEc SW SE 23-5-8 W	2090-2400	25M
Little Nick	4	NEc NW NW 35-5-8 W	2027-2400	36M
Hall	1	SWc 1-4-8 W	T.D. 2376	19M
Galton	1	SWc 25-4-8 W	T.D. 2094	4½M
Prairie	4	SEc NE 3-4-8 W	T.D. 2447	Dry

Grant County

Company	Well No.	Location	Depth	Init. Prod.
Prairie	3	NEc NE½ 22-27-3 W	4088-4094	20&3M

Hughes County

Company	Well No.	Location	Depth	Init. Prod.
Winkler et al	1	C SW SE 31-5-9 E	T.D. 2955	Dry

Kay County

Company	Well No.	Location	Depth	Init. Prod.
Harris et al	2	NEc NW SW 22-29-1 W	T.D. 2160	Dry
Greer et al	2	C NW SW 19-29-1 W	T.D. 1560	Dry
Empire	1	SWc SE 29-29-1 W	T.D. 3593	Dry OWD
Prairie	1	SEc SW½ 36-28-1 W	594-676	½M
Harris et al	2	SWc 30-29-1 W	942-947	1M

Logan County

Company	Well No.	Location	Depth	Init. Prod.
Ramsey	1	NEc SE NW 28-18-4 W	T.D. 1000	Dry

Muskogee County

Company	Well No.	Location	Depth	Init. Prod.
Dixon	5	C SE 2-14-18 E	T.D. 1944	Dry
Evans et al	1	SWc NW SW 2-14-19 E	T.D. 478	Dry
Linthecum	2	CSL SW NE SE 5-14-19 E	T.D. 685	Dry
Towner et al	4	SWc SE SW NE 6-14-19 E	T.D. 497	Dry
Boyle et al	1	SWc N½ NW SW 9-15-15 E	1620-1624	15
Foltz	1	SEc SW NW 20-15-16 E	1193-1200	4M
Haner et al	2	SWc 9-15-18 E	777-802	½M

Okfuskee County

Company	Well No.	Location	Depth	Init. Prod.
Champlin	2	NWc SW SW 14-11-11 E	3508-3530	225
Phillips et al	1	NWc NE NW 21-10-9 E	3270-3278	30M

Okmulgee County

Company	Well No.	Location	Depth	Init. Prod.
Moffett et al	5	NEc NW NE 7-11-12 E	1950-1972	10
Peterson	5	NWc SW 9-15-14 E	1826-1841	15M
Amerada et al	1	SWc SE 7-14-11 E	T.D. 3076	Dry
Saint et al	1	NEc SW NW 12-14-12 E	T.D. 2759	Dry
Jones et al	1	C SW NE 14-14-13 E	T.D. 1932 OWD	Dry

Osage County

Company	Well No.	Location	Depth	Init. Prod.
McCuen et al	1	SWc NW 15-24-8 E	T.D. 872 OWD	Dry
Delmar	1	C NE 4-23-10 E	T.D. 2263	Dry
Phillips	7	NWc SE 17-27-6 E	2885-2951	600
Gypsy	4	NE NW 28-27-6 E	2924-2976	135
Kewanee	1	SEc NE 28-27-6 E	2896-2955	190 (10 hrs.)
Kewanee	6	NWc NE 28-27-6 E	2900-2978	1602
Carter	4	SEc 3-26-6 E	2850-2924	357&8M
New England	1	SEc SW 17-23-10 E	2594-2600	5
Mid-Kansas et al	1	SWc SE NW 27-21-10 E	1530-1551	10

Pawnee County

Company	Well No.	Location	Depth	Init. Prod.
Turner et al	2	NWc SW SW NW 29-20-9 E	1093-1124	.1M
Markham et al	2	NEc SW SW NE 9-20-9 E	T.D. 2804	Dry

Payne County

Company	Well No.	Location	Depth	Init. Prod.
Payne County Gas	2	NWc SE SE 7-18-4 E	4250-4286	125

Pittsburgh County

Company	Well No.	Location	Depth	Init. Prod.
Speltor	1	NEc 17-7-18 E	1900-2065	15M

Pontotoc County

Company	Well No.	Location	Depth	Init. Prod.
Louisiana	12	NEc 19-5-8 E	2554-2495	150
Conservative	1	NEc NW 28-5-6 E	T.D. 2709	Dry
Ramsey	1	NWc NE SW 21-5-8 E	T.D. 2990	Dry

Pottawatomie County

Company	Well No.	Location	Depth	Init. Prod.
Wilcox	1	SEc SW 32-11-2 E	T.D. 4500	Dry
Edwards et al	1	NEc SW 16-10-5 E	T.D. 4792	Dry
Indep.-Darby	8	SEc NW NE 8-9-5 E	T.D. 4504	Dry

Seminole County

Company	Well No.	Location	Depth	Init. Prod.
Shaffer	3	SEc SW 1-9-5 E	T.D. 4570	Dry
Magnolia	4	NEc SW SW 3-9-5 E	T.D. 4275	Dry
Gypsy	4	SWc NE 4-9-6 E	T.D. 4698	Dry
Barnsdall	2	NWc SW SW 1-9-5 E	4598-4599	473
Barnsdall	1	SEc NW 1-9-5 E	4318-4331 OWD	254
Shaffer	6	NEc SE SW 1-9-5 E	4369-4371	1027
Twin State	4	NWc NE SW 2-9-5 E	4351-4365	800
Independent et al	2	NEc 11-9-5 E	3503-3538	100
Pure	6	NEc SW 3-9-6 E	4507-4510	50
Roxana	3	NEc SW NE 3-9-6 E	4621-4665	149
Jarvis et al	1	NEc SW SW 10-9-8 E	3505-3532	60&8M
Sinclair	1	SWc NE NE 10-8-6 E	4138-4162	2082
Barnsdall	1	SEc NW SE 22-7-6 E	4266-4397	70
Louisiana	1	SWc 8-5-8 E	2593-2632	1163
Louisiana	3	SW NE NE 18-5-8 E	2662-2670	604
Ramsey	1	NW SE NE 18-5-8 E	2583-2608	576

Stephens County

Company	Well No.	Location	Depth	Init. Prod.
Malernee	1	NWc NE NE 34-1-8 W	T.D. 2300	Dry
Hanbury	6	NWc SE NW SW 27-1-8 W	1715-1717	10
Toughey et al	2	SEc SW SE SE 3-3-5 W	1050-1062	10

Tulsa County

Company	Well No.	Location	Depth	Init. Prod.
George	1	NWc SW 7-17-13 E	1859-1876	25
Holmes et al	1	SEc NE SE 22-19-10 E	T.D. 2455	Dry
Regal	4	CEL W½ SE 5-19-11 E	T.D. 2337	Dry
Enfisco	1	C W½ NW 14-17-13 E	T.D. 1980	Dry

Wagoner County

Company	Well No.	Location	Depth	Init. Prod.
Chapman	2	SWc NE SE 19-18-18 E	T.D. 910	Dry
Peterson et al	1	C SW SE 23-16-16 E	T.D. 1015	Dry
Ford et al	1	CSL SW NW 3-16-18 E	T.D. 500	Dry

KANSAS

Butler County

Company	Well No.	Location	Depth	Init. Prod.
Rosenthal et al	9	SWc SE SE 4-27-6 E	3133-3141	150
Blankinship	1	SWc NE 22-26-4 E	T.D. 3438	Dry

Cowley County

Company	Well No.	Location	Depth	Init. Prod.
Derby	1	NEc SE NE 32-30-3 E	T.D. 2204	Dry
Neeley	1	C NW NE 5-33-5 E	T.D. 3180 OWD	Dry
Wilson et al	1	C SW SE 7-35-3 E	T.D. 785	Dry
Boggs	1	C NE NW 5-33-5 E	627-635	.16M

Greenwood County

Company	Well No.	Location	Depth	Init. Prod.
Theta	4	SWc SE 23-22-12 E	1669-17.9	100
Theta	5	NEc SE SW 23-22-12 E	1670-1682	25
Empire	6	SEc NE NW 25-22-12 E	1691-1707	150
Empire	7	SWc NW NW 25-22-12 E	1670-1711	125
Empire	9	SEc NE 25-22-12 E	1682-1715	420
Rhodes et al	1	SWc NE SE 30-22-13 E	1681-1701	150
Marcus et al	1	NEc SE SW 6-24-11 E	1826-1840	45
Culp et al	1	C NE SE 28-27-13 E	T.D. 1575	Dry

Marion County

Company	Well No.	Location	Depth	Init. Prod.
Phillips	1	NEc SW NE NE 22-17-4 E	2390-2440	40
Givens et al	1	SWc NE 31-17-4 E	T.D. 2703	Dry

McPherson County

Company	Well No.	Location	Depth	Init. Prod.
Lamar et al	1	SEc SW 1-17-3 W	T.D. 3600	Dry

Sumner County

Company	Well No.	Location	Depth	Init. Prod.
Roxana	1	NWc 14-32-2 E	2021-2103	156

Woodson County

Company	Well No.	Location	Depth	Init. Prod.
Young et al	1	SWc NW NW 21-23-14 E	1626-1643	20

for the use of the navy should there be a shortage in the fuel oil supply. The territory is subject to the usual rules of the Osage council and the interior department as to manner of leasing and nothing within a mile of the well has been leased for oil.

The drilling of this well turns up one of those oddities in the system of leasing the Osage. The Kay County Gas Co. had merely a gas lease on this tract and on others in the region. Oil and gas leases in the Osage are let separately. The Kay County has an oil well which looks like a good one, but it will be sold to the highest bidder and the Kay County hasn't even a preferential right to buy it. The company will, of course, be reimbursed for the drilling by whoever buys the oil lease.

In Western Tulsa county, a semi-wildcat was drilled in by the Glidden Oil Corp. during the week. This is in the bed of the Arkansas river and is in the NE NW NW SE of 15-19-11E. Its size was the important feature. Its maximum to the end of the week had been 70 barrels per hour of 39 gravity oil. Production was found in the Hominy sand at 2106-22 feet.

Township 7-3E, southwest of the Seminole district, continues to have its exciting moments. Several weeks ago the Indian Territory Illuminating Oil Co. drilled into big production in the Viola lime, in No. 1 Sullivan, SW NW SE of 25-7-3E, whereupon the offset, completed some time before by the Magnolia Petroleum Co., ceased to produce. The I. T. I. O. well declined in production, falling to 750 barrels. It was deepened during the week from 4216 to 4224 feet and came back with 3,742 barrels. The following day it made 3126 barrels, but was cutting about 5 per cent and the gravity had dropped from 38.8 to 34 degrees. Several other wells in the area have been producing from the Viola, including the Magnolia's two wells in the same section, but none on the scale of the I. T. I. O. well.

File Suit for Riverbed Land

HOUSTON, Feb. 27.—Suit for title to oil land in the bed of the north fork of the Red river, in Gray and Hutchinson counties, has been filed by the state of Texas against 192 defendants, including the Magnolia, Texas, Skelly, Gulf, Humble, Roxana, Mid-Continent and Lone Star companies. The land claimed by the state begins at the stream intersection with the 100th meridian and extends through Gray and Wheeler counties. Claim to title is based on the contention that north fork of Red river is a navigable stream.

New Field Operations in Oklahoma, Kansas, Panhandle, North, North Central and West Texas, Week Ended February 25, 1928

OKLAHOMA

Bryan County

Company	Well No. Farm	Location
Magnolia	2-Marshall	SWc NW NW SW 26-5-7 E

Carter County

Magnolia	1-Ragsdale	SWc 5-2-3 W

Coal County

Galbreath et al	1	SWc SE 24-1-9 E

Creek County

Detrick et al	1-Morton	SEc NE SW 27-14-10
Roberts	1-Panoske	SWc 2-15-10
Winemiller et al	2-Deenun	SWc NE 4-17-11
Sterling	1-Leenun	NEc SW 4-17-11
Smith et al	5-Fife	NWc SE 4-17-11
Skelly et al	1-Dickson	NWc SW 19-17-10
Jackson et al	3-Thomas	SWc NW 13-17-10
Wood et al	3-Charcotenne	NEc NW SE 21-17-9 OWD
Pure	12-Crow	CNL SE SE 26-18-12 OWD
Gled	1-West	NEc SW NW 17-18-9 OWD
Devonian	6-Bigpond	SWc NW SW 36-15-7 E

Garvin County

Magnolia	2-Ringer	SEc NW NE NE 15-1-3-W OWD

Grady County

Okla. Gas Utilities	11-Farwell	NEc SE NE 26-5-8 W
Okla. Gas Util	10-Farwell	SEc NE NE 26-5-8 W
Okla. Gas. Util	9-Farwell	NEc 26-5-8 W
Meridan	5-Farwell	NWc NE SE 23-5-8 W

Grant County

Palmer et al	1-Lupton	SWc SE 26-28-3 W

Jefferson County

Heydrick et al	1-Spring	SWc NW SW 24-6-6 W

Kay County

Royal	1-Brazelton	C NW SW 5-27-1 E
Wilson et al	1-Bersche	SWc SE 4-27-1 E
Industrial	2-Walker	C SE NE 2-27-1 W
Royal	1-Keller	C SW SE 33-28-1 E

McIntosh County

Beggs	3-Bray	C SE SE 3-12-15 E

Muskogee County

Ford	3-Clark	SWc SE NW SE 6-14-19 E
Blackwood et al	1-Bennett	SEc NE SW 6-14-19 E
Paul et al	3-James	SWc NW SW 17-14-17 E
Bradley et al	1-Rogers	NWc SE 21-15-19 E
D. L. T.	2-Mackey	SEc SW SW 9-15-18 E
Bryan et al	1-Lowery	NWc S½ NW SW 9-15-15 E

Noble County

White et al	1-Cooper	C NW SW 5-24-1 W

Okfuskee County

Schermerhorn	1-Norris	C SE NW 20-10-9 E
Minnehoma	3-Holmes	C NL NE NW 30-11-11
Riverland	2-Barnett	CSL SE SW 19-11-11
Henry	1-Sears	SEc NE 5-11-11

Okmulgee County

Peterson et al	1-Asbury	NEc SE 8-15-14 E
Love et al	2-Brown	NEc SE NE SE 15-15-12
Thompson et al	1-Scott	SEc NW SE 28-15-11
Harsha et al	1-Harrison	SWc NW 35-16-14

Osage County

I. T. I. O.	388—	SEc 13-26-10
Carter	9—	SWc NE SE 3-26-6
Carter	8—	NWc SE SE 3-26-6
Osage	1—	NWc NE 1-21-8

Pontotoc County

Ramsey	4-Miller	SEc 18-5-8 E
Lewis et al	1-Walton	C SW SW 7-3-7 E
Homa Okla	9-McCall	NEc 17-5-8 E
Shaffer	6-Yoakum	NWc 16-5-8 E

Pottawatomie County

Slick	1-Sch. Ld.	SEc 16-6-5
Wilcox	1-Wyatt	SEc NE NW 10-7-4 E
I. T. I. O.	2-Sullivan	NWc SE 25-7-3

Seminole County

Snowden et al	2-Epply	NWc NE 15-10-8 E OWD
Magnolia	2-Hyde	NEc SE NW 13-9-5
Sinclair	2-Taylor	NWc NE NE 10-8-6
Sinclair	3-Taylor	SEc NE NE 10-8-6
Dixie	1-Lizzie	SWc NW NW 11-8-6
Twin State	4-Jones	NEc SE 11-8-6
Twin State	1-Marshall	SEc SW NW 7-6-8 E
Mid-Continent	3-Fleet	NEc NW SE 8-5-8 E
Magnolia	1-Reed	NWc 17-5-8 E

Stephens County

Carter	2-Morgan	SWc NW NE 32-1-8 W
Big Twelve	5-Taliaferro	SEc SW 27-1-8 W
Amerada	2-Hanson	SWc SE SE SW 12-1-4 W
Pace et al	7-Absner	NWc 7-3-7 W

Tulsa County

Berry et al	3-Funk	NWc NE 3-16-12
Holmes et al	1-Unallotted	NEc 31-19-11
Glidden et al	1-Johnson	SWc NE 15-19-11

Wagoner County

McDougal	1-Dan	SEc NW NW 21-17-15 E OWD

KANSAS

Butler County

Marland et al	1-Stephenson	NEc SE 35-23-3 E
Fleming et al	1-Brainerd	NEc NW 22-24-3 E
Federal	12-Drum	CNL NE 31-26-8 E
Shawver et al	1-Nelson	NEc SE 8-29-8 E

Cowley County

Herron et al	1-Marshall	SWc NE 36-30-6 E OWD
Lewis	1-Pearce	SEc SW SE 30-31-6 E
Pryor et al	2-Drury	NWc NE NE 31-31-6 E
Independent et al	1-Swenson	SWc NW SW SE 15-32-4 E OWD
Misson	1-Evans	Lot-9, Blk-42, 22-32-4 E
McNabb et al	2-Wallace	22-32-4 E OWD
McNabb et al	1-Mattison	22-32-4 E OWD
Barnsdall	1-Russell	SEc NE NW SE 15-33-4 E

Dickerson County

Johnson et al	1-Schlessner	C SW NE 18-16-4 E
Stats et al	1-Smith	NEc SE SW 23-16-4 E

Geary County

Pioneer	1-Chase	SEc 10-12-7 E

Greenwood

Empire	10-Schwab	NEc SE 25-22-12 E
Darby	9-Schwab	SEc NW 30-22-13 E
Empire	1-Schwab	NWc SW 30-22-13 E
Empire	2-Schwab	NEc NW SW 30-22-13 E
Empire	3-Schwab	NWc NE SW 30-22-13 E
Empire	4-Schwab	NEc SW 30-22-13 E
Skelly	1-Schwab	SWc NE 30-22-13 E
Tidal	1-Schwab	SEc NW SE 30-22-13 E
Tidal	2-Schwab	SWc NW SE 30-22-13 E
Tidal	3-Schwab	NWc SE 30-22-13 E
Tidal	4-Schwab	NEc NW SE 30-22-13 E
Nathan et al	1-South	NEc NW SE 36-23-10 E
Davis et al	1-Olson	NEc SE 6-25-9 E
Empire	1-Johnson	SEc NE NE 8-25-12 E
Hood et al	1-Russell	C SE SE 15-26-11 E

McPherson County

Rosenthal et al	1-Johnson	C SE SE 30-18-2 W

Marion County

Shearer et al	1-Wright	SWc NW SE 14-18-4 E

Morris County

Madison et al	1-Barkin	NWc SW SE 29-15-5 E
Farrell et al	1-Albright	SWc SE NE 20-16-5 E

Seward County

Ash et al	1-Son	NEc 14-33-33 W OWD

Sumner County

Roxana	4-Sleigh	SWc SE NW SW 25-31-2 E
Roxana	6-Shore	NWc SE NW SW 25-31-2 E
Washahoma	1-Busard	NEc SE NE SE 26-31-2 E
Roxana	5-Taton	SWc NE NW 36-31-2 E
Roxana	10-Townlot	Lot-4, Blk-84, 11-32-2 E
Noble et al	1-Sheek	Tract-4, 14-32-2 E
Wasson et al	7-Gassoway	SWc SE SW 14-32-2 E
Roxana	3-Fritz	Out Lot-26, 14-32-2 E
Roxana	2-Barnes	SEc SW SW 14-32-2 E
Roxana	11-Emerich	14-32-2 E
Roxana	12-Emerick	Tract-5, 14-32-2 E
Palmer et al	3-Wenrich	NWc NE NW 23-32-2 E
Palmer et al	4-Wenrich	NEc NW NW 23-32-2 E

TEXAS

NORTH AND NORTH CENTRAL

Archer County

Company	Well No. Farm	Location	Survey
Wilson et al	1-Parrish	Blk-234	Townsite
Humble et al	2-Wilson	Blk-231	Townsite
Humble et al	1-Wilson	Blk-231	Townsite
Petroleum Prod	1-Wilson	Sec-20	Townsite
Geoyum et al	1-Birdwell	Sec-2418	TE&L
Consolidated	1-Kinder	Sec-59, Blk-t	Clark et al
Cullum et al	1-Anderson	Blk-19, Abst-439	SP
Fain et al	1-Wilson	Blk-27	GCSL
Galhke et al	3-Wilson	Blk-235	Townsite
Panhandle et al	1-Peller	Blk-25	Harris

Brown County

Phillips	9-Hickman	Blk-783	Denson
Shuler et al	2-Boyson	....	Williams
Gilman et al	1-Hickman	Blk-783	Benson
McMurray et al	3-Hickman	Blk-783	Benson
Phillips	7-Hickman	Blk-783	Benson
Syndicate	3-Curry	....	Betts
Richards	1-Hutton	....	Nobles
Bush et al	2-Richards	....	SA&MG
Pandem	4-Hutton	....	Nobles
Pandem	5-Curry	....	Betts
Mitchell	2-Alcorn	Blk-623	Honeycutt
Cen Tex	3-Alcorn	Blk-623	Honeycutt
Denniger	1-Smith	....	Thom
Lehaman et al	6-Evans	Blk-20	Woodward

Callahan County

Pardee et al	1-Alexander	Sec-116	BBB&C
Kingwood et al	1-Sherry	Sec-23	Vic. Co., Schl. Land

Coleman County

Roth et al	3-Smith	Sec-19, Blk-1	GH&H
Roth et al	1-Smith	Blk-57	Coleman Co., Sch. Land
Empire	1-Casey	....	T&NO
Montray	1-Padgitt	Sec-141, Blk-225	Brazona Co., Schl. Land

Comanche County

Scoggin et al	1-Pottet	Sec-45	D&DA

Cooke County

Oil Oper. et al	1-Haighes	Abstract-534	Jones
Green et al	3-Campbell	Abstract-607	Leverett
Stoneman et al	1-Fields	Abstract-750	Morgan
Brownfield et al		Abstract-433	GH&H

Eastlan County

Root et al	4-Watson	Sec-37, Blk-4	H&TC
Cranfill et al	2-Turner	Sec-30, Blk-2	H&TC
Lewis et al	1-Johnson	Sec-11, Blk-4	H&TC

skell County

Phillips	1-Moelle	Sec-3, Abstract-991	Mathis

Jack County

Security Drlg	8-Cullers	Sec-4, Abstract-2188	Cullers

Jones County

Phillips	5-Winters	Sec-19, Blk-19	T&P

Montague County

Beckman et al	1	Abstract-141	Crabtree

Runnels County

Sommers et al	1-Reese	....	Day Land & Cattle Co.
Marland	1-Heniny	Sec-121	ET
Marland	1-Williams	....	Roach

Shackleford County

Amerada	1-Alexander	Sec-2, Blk-14	T&P
McLester et al	2-Moberly	Sec-1, Blk-12	T&P
Big State	4-Webb	Sec-27, Blk-11	T&P

Stephens County

Texas Fidelity	2-Cook	Sec-26, Blk-6	T&P

Wichita County

Bridwell et al	1-Spark	Abstract-36	Castleman
Evert et al	3-Cooper	Blk-292	Waggoner

Wilbarger County

Fain et al	1-Waggoner	Sec-50, Blk-4	H&TC

Young County

Wolfe et al	2-Lowe	Sec-59	TE&L
Pennell et al	1-Boone	Sec-1, Abstract-34	BBB&C
Donahoo	1-Fun	Sec-320, Abstract-567	TE&L
Seigler et al	1-Bloodworth	Sec-216	TE&L
Nash et al	4-Henson	....	Pier
Texas-Pacific	5-Donnell	Sec-1211	TE&L

WEST AND PANHANDLE

Cochran County

Marland	1-Slaughter	SWc League-130	Carson Co., Sch Land

Posters Teach Field Men Care Of Producing Equipment

HOUSTON, Feb. 28

WHEN the screw has been set for another run on a cable tool job, or the rotary table is grinding away without need for special attention, the driller on Beautiful Hope No. 1 of the Anxious Oil Co., strolls leisurely across the derrick floor and unconsciously looks for something to occupy the time hanging heavy on his hands.

Though his ear is cocked for any unusual sound calling for attention to the machinery, the driller's thoughts will take most any direction to which they may be turned by sign or placard. The motivating principle is much the same as that which influences the impatient traveler in the depot waiting room of a small town to read the safety signs and railroad regulations while waiting for his train.

It was largely to take advantage of this human trait that the American Petroleum Institute standardization division developed the idea of using posters in derricks and tool houses to bring increased attention to the desirability of using A.P.I. drilling and producing equipment. It was only a short step further to utilizing this same method for emphasizing the codes governing usage of these materials.

The first poster of the group authorized at the December general meeting in Chicago has been sent out by Carl A. Young of Dallas, standardization director of the Institute. It shows the scope and some of the advantages of using the A.P.I. standards. Copies of this poster are being put up by operating companies in the field in derricks, tool houses or other places where field men congregate.

Already the work is bearing fruit, according to Mr. Young, although only one of the posters has been issued. "We are now working on the others," he advises from Dallas, "and hope to have them completed shortly." These will deal with care and use of specific materials.

REACTIONS of field men to the posters are interesting, according to Mr. Young. A driller will take an extra bite of "Mail Pouch," scornfully say there's nothing new about some part of the equipment arrangement and then, sighting something else, remark: "that's different and I'll be doggoned if it don't look good."

Thus ideas are born and the man on the job gets to know that the engineers contribute something he can understand after all.

Subsequent posters to be sent out will be smaller in size than the first one, a 19x26-inch placard showing the scope of standardization. It is also the plan to make up the smaller posters in such a way that they may be signed by some company executive, so that, when posted on a lease, they will carry the force of an executive order.

The original poster, a copy of which is reproduced herewith, has been sent free to all persons interested in production and development, or allied branches of the industry, who can make good use of them. Copies may be had by addressing a letter to Mr. Young at 1508 Kirby building, Dallas. The smaller posters on care and usage of materials will be sold at a nominal price which is intended merely to cover the cost of preparation and printing.

Trade Body Studies Price Wars In Alabama, Georgia

Staff Special

NEW ORLEANS, Feb. 25

REPRESENTATIVES of the Federal Trade Commission are understood to have been conducting an investigation the past few days into the tank wagon and service station prices of gasoline in the southeast especially in Alabama, Georgia, Louisiana and Mississippi, the investigation being the result of action by members of the Alabama Independent Oil Marketers Association.

The first move was made a few weeks ago when representatives of the association met here for the purpose of requesting the Federal Trade Commission to conduct an investigation. The representatives later appeared in Washington for the same purpose, and two investigators were reported to be in the territory at present.

Price wars are known to have been carried on for some time in many places in the states named above. Charges of price cutting, rebates, sign-rentals, etc., have been frequent. In many places in Alabama the net tank wagon has been 8 cents a gallon. Deducting a freight rate from north Texas of 3.76 cents a gallon, for instance, the netback to the refiner distributing his own product in that territory has been around 4.25 cents a gallon, no allowance being made for evaporation, distribution or other handling.

As of Feb. 13, the counties of Montgomery, in which is located the city of the same name; Barbour and Russell had a net tank wagon price of 8 cents a gallon, while Henry county had a net price of 10 cents, and Dale county had a price of 14 cents. Other places the net tank wagon ranged from 14 to 15 cents. At the same time the net tank wagon in Macon, Ga. was 9 cents a gallon.

Independent jobbers on the other hand report they have been severely handicapped in buying gasolines with such a low tank wagon at prices which would allow them to operate on an even basis.

One of the largest jobbers in that section of the country for years has sold a benzol-blend gasoline at the state wide posted service station price on gasoline. He has in the past advertised his product extensively as a benzol blend at the same price as ordinary gasoline.

Last week he announced, however, that as long as the price situation was so chaotic in his territory, that he would sell his benzol blend brand at 2 cents above the prevailing service station price, and would sell ordinary U. S. Motor gasoline at the prevailing service station price.

The Federal Trade Commission has been asked to investigate with a view to determining just who is to blame for the present situation, and if possible to correct it. The consensus of opinion in this area is that the fight of two or three major companies for gallonage has been the primary cause, and that the Independent jobbers have a uniformally clean slate in the states affected.

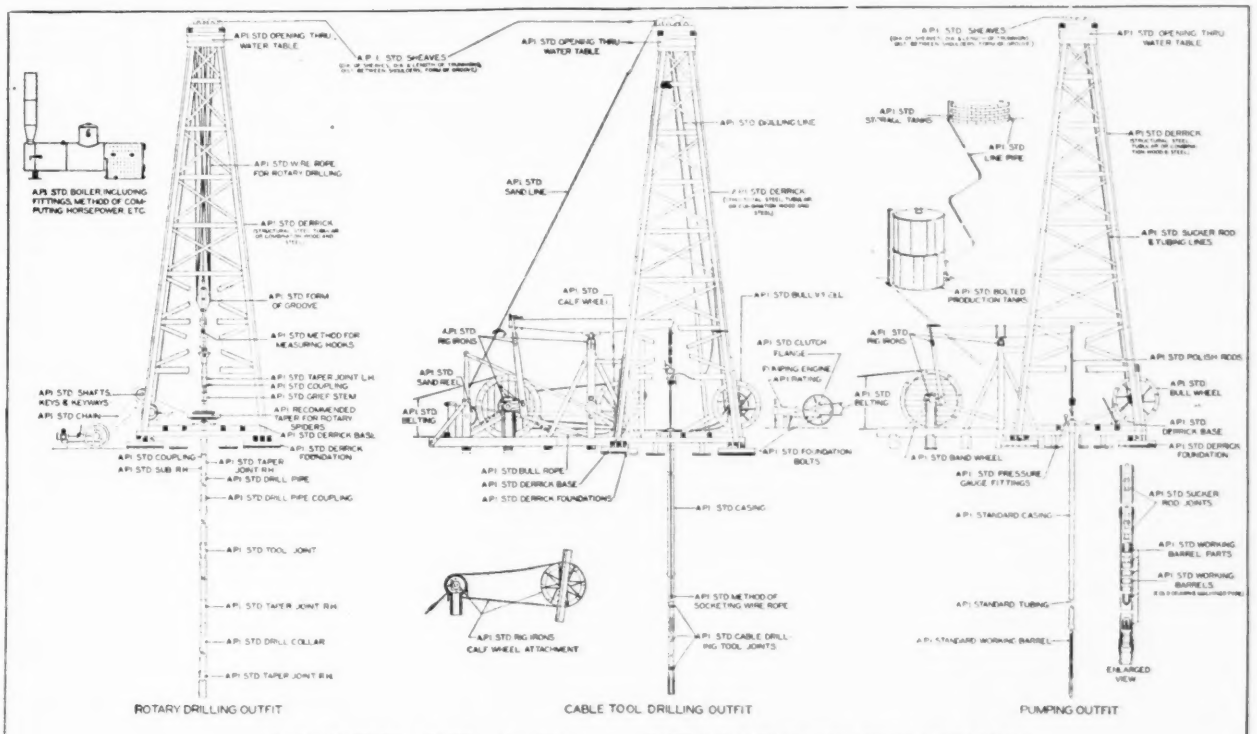
Closes Million Barrel Fuel Contract
(By Telegraph)

LOS ANGELES, Feb. 27.—A major California company has closed a contract for movement of 1,000,000 barrels of fuel oil through the Panama canal during the year at a reported price of 67 cents a barrel. It is understood that this contract was placed after it was learned that California producers would close in approximately 75,000 barrels daily average crude production, much of which would be heavy crude.

FINDLAY.—On Feb. 23 the Ohio Oil Co. reduced Illinois, Princeton and Plymouth crudes 10 cents per barrel, making new prices of Illinois and Princeton, $1.50, and Plymouth, $1.23.

Poster No. 1 in Series to be Sent Out by Standardization Committee of American Petroleum Institute and Placarded in Oil Fields Teaching Field Men Proper Care of Equipment

Some Advantages of Specifying A. P. I. Standards on DRILLING AND PRODUCING EQUIPMENT



SCOPE OF A.P.I. STANDARDIZATION

1. Look for the A. P. I. Monogram:

This monogram, stamped on materials, indicates that such material was made in accordance with A. P. I. specifications and is placed there for the convenience and protection of the oil operator.

2. Interchangeable Threads on Casing, Drill Pipe, Tubing and Line Pipe

Tubular material made in accordance with A. P. I. standards is of uniform quality and workmanship and is checked by Master gages certified by the Bureau of Standards. This means that threads made by different manufacturers are within the limits specified in the A. P. I. Pipe Specifications. Pipe made by one manufacturer should safely interchange with pipe made by another manufacturer.

3. Interchangeable Taper Joints for Rotary and Cable Tool Drilling

All A. P. I. taper joints for rotary or cable tool work are checked with certified A. P. I. Master gages insuring uniform threads on new material. Joints made by one manufacturer should interchange with joints made by another manufacturer. This means that a swivel coupling made by one manufacturer, grief stem made by another, tool joint made by still another and drill collars and fish tail bits made by still another, if turned to A. P. I. standards, should safely screw together.

(Cable Tool material with A. P. I. Joints now on the market as master gages have been completed and delivered to principal manufacturers. Master Gages for Rotary Drilling Taper Joints should be ready by approximately June, 1928, after which date Rotary material with A. P. I. standard joints should be available from the manufacturers.)

4. A. P. I. Standard Boilers

Boilers made to A. P. I. specifications insure:

(a) Uniform quality of material and workmanship.

(b) Uniform methods of computing h. p. rating; viz: 10 sq. ft. of heating surface equals 1 h. p.

(c) Standard list of fittings.

(d) Standard size of bonnet, making stacks interchangeable on boilers of equal h. p. rating.

(e) Standard hand-hole plate.

5. A. P. I. Standard Derricks and Rigs

Derricks made to A. P. I. standards insure:

(a) Uniform opening in water table making crown blocks interchangeable.

(b) Uniform heights and bases.

(c) Definite working capacities.

(d) Minimum wind load capacity of 70 miles per hour.

(e) Standard dimensions for bull and calf-wheels, band-wheels, etc.

6. A. P. I. Standard Rig Irons

Rig Irons made in accordance with A. P. I. specifications insure interchangeable band-wheel flanges, wrist pins, keys and key-ways, jack and calf-wheel boxes, center irons, pulley diameters and dimensions of trunnions, calf-wheel attachments, etc.

7. A. P. I. Standard Wire Rope and Manila Cordage

Wire Rope and Manila Cordage made to A. P. I. specifications have passed uniform methods of tests and comply with definite requirements on physical properties.

8. A. P. I. Standards on Pumping Equipment

Definite standards have been adopted on:

(a) Sucker Rod Joints, making threads interchangeable between manufacturers.

(b) Working Barrels, both Cold Drawn and Machined type; also Working Barrel Parts.

(c) Standard method of rating h. p. of internal combustion engines; standard flange connections between clutches and engines.

9. A. P. I. Standards on Belting

Belting made in accordance with A. P. I. specifications complies with specific tests on initial elongation, tensile strength, etc.

10. A. P. I. Standard Tanks

Specifications have been adopted on riveted steel tanks for oil storage, providing for standard sizes of sheets, rivet spacing, etc., and uniform grade of material. These specifications will be available for general distribution early in 1928. Bolted tanks still under consideration.

For further information apply to
A.P.I. DIVISION OF STANDARDIZATION
1508 Kirby Bldg., Dallas, Texas

The Editors' Viewpoint

National Petroleum News

Dry Hole "Investing"

HERE are a few facts each oil man can put aside for use the next time someone outside the industry asks him about "investing" in wildcat oil companies:

In Montana 170 straight wildcat wells have been drilled to-date. Of these 8 were good and 162 dry or gas. That means that more than $5,000,000 was spent trying to find oil without success.

In the same state, out of a total of 1,376 holes drilled to-date in known fields, 390, or 28 per cent, were dry, representing a cost—and loss—of more than $12,000,000 in trying to find oil in so-called known fields without success.

Total dry hole money spent in Montana to-date is more than $17,000,000, for which the spenders got nothing but the knowledge there was no oil or gas at the bottom of these particular holes.

Estimated cost of drilling the good wells was about $31,000,000.

Value of oil and gas produced in state to-date, $32,700,000. Deducting this gross income from total cost of all drilling there leaves to-date more than a $16,000,000 deficit, to which must be added the operating costs.

And we don't hold up Montana as any terrible example. Conditions run somewhat the same everywhere.

Producing oil is a business that in the main is profitable, but what the average outsider "invests" his money in is not the business of producing oil, but some speculator's venture to unload a lot of acreage at a big profit.—W. C. P.

Tulsa Keeps Growing

WHILE the oil business has not been as profitable the past year as some previous ones, nevertheless one can't help but consider the tremendous continued growth of Tulsa, and the fact that that growth has come from the oil industry. Business couldn't be so bad and have such substantial growth.

Nearly $15,000,000 of building permits were issued in Tulsa in 1927, just twice the amount issued the year before. Bank deposits and postal receipts showed handsome increases.

But the best way to judge of the substantial character of this growth is for one to go to Tulsa, stay at one of the best hotels in the country—the Mayo—look over another hotel or two that are building; see some of the big office buildings completed and others that are going up and then drive through the residence districts and see the ever increasing number of good homes of all kinds.

The streets are still packed with high priced cars, keeping up Tulsa's reputation of having more high priced cars per inhabitant than any other city in the world. We don't vouch for this last statistic, but it easily seems true.

Without the oil industry Tulsa would hardly be a spot on the prairie.

So it can't be such a bad business after all, this thing of producing the life fluid of the nation.—W. C. P.

Whose Eight Million?

THE state of Illinois has approximately $8,000,000 which has been paid to it under the gasoline tax law which went into effect August 1, 1927, and which has just now been declared unconstitutional by the Illinois Supreme Court. The law imposed the tax upon the distributors of gasoline, not upon the consumers. In most instances the tax was passed on to, and collected from, the consumers. The question arises who is entitled to it.

Technically the consumers paid no tax, but merely an increased price. Furthermore most consumers will find it very difficult to prove the amount of tax paid by them, first because of failure to keep records and, second, because certain distributors collected no tax but absorbed it themselves, and it will be difficult for the consumers to prove in what cases the tax was paid by them.

The distributors will have their difficulties also because they have, in most instances, increased their price sufficiently to cover the tax and so are not morally entitled to it. The state, however, is least of all entitled to it because it was collected under an unconstitutional statute.

This dilemma illustrates the old adage that it is better to lock the stable before the horse is stolen. The oil industry, in all probability, could have defeated this bill as the tax was unnecessary for the building of the hard road system for at least four more years and it was passed by a margin of only one or two votes, after great pressure had been placed upon the legislature by the governor who is seeking re-election upon a hard roads program. The failure of the oil industry to defend itself and its customers resulted in this impasse.

The decision of the supreme court rests upon faulty drafting of the statute and it would appear that another law may be drafted which will be constitutional. Therefore, it seems likely that an attempt will be made to pass another law at some future session of the legislature. If the oil industry would arouse itself from its lethargy it could defend itself from its increasing use as a political football and prevent future losses of this character to itself and its customers.

The usual argument advanced by oil men for the inaction of the oil industry is that it is feared, if the public learns the industry opposes bills it is sure to be passed. It is only necessary to point to the passage of gasoline tax laws in 46 states of the union, in spite of this inactivity on the part of the oil industry, to refute this argument.

(Contributed by Benjamin Wham, attorney, Chicago)

You can get these

New Big Margin *Profits*

sell GRAIGRENE

[PRONOUNCED GREY-GREEN]

— *the new fluid lubricant for transmissions and differentials*

GRAIGRENE opens a new rich field for oil jobbers. Motorists everywhere are learning the wisdom of using Graigrene in transmissions and differentials—vital zones of lubrication which have been sadly neglected in the past.

Every Car Needs Graigrene

Right now every one of America's 20,000,000 motor cars should use—actually needs—an average of 8 pounds of Graigrene—busses and trucks require 40 pounds and more—tractors always take 50 pounds or more. Possible consumption of Graigrene is enormous. Periodic "repeats" are also necessary. Think what this volume of new Graigrene business means to you in this age of small profits and intense competition.

50% Profit on Direct Sales

Graigrene pays you unusually big profits when you sell to garages, car dealers, etc. Big volume is possible with these outlets. When you sell Graigrene direct—through your own stations—you make 50%. That's real reward for your efforts.

Get Back Your Local Business With Graigrene

This business, led away by national specialty salesmen, is rightfully yours. You can regain it with Graigrene. Graigrene also makes new customers, acts as a feeder for your other products and service.

Strong Advertising Behind Graigrene

Strong advertising backs Graigrene. We provide posters, capacity charts, folders, handout pieces, electric globes, direct mail letters—sales aids that will make Graigrene move swiftly. "Ads" bearing your name and address will appear in local newspapers covering your territory.

We offer big territories and long term contracts. Get acquainted with Graigrene *right away.* Don't wait until some other jobber has covered your territory. Write us TODAY.

GRAIGRENE
the efficient fluid lubricant

Always Runs Free

Graigrene never thickens or congeals, even at 60 degrees below zero. It always runs free, reaches every surface, every gear tooth in transmission and differential. The bath of lubrication is constant—continual—if Graigrene is used.

Heavy grease freezes up ("channels") leaves gear teeth to mesh unprotected, steel against steel. But this is impossible with Graigrene, the fluid lubricant.

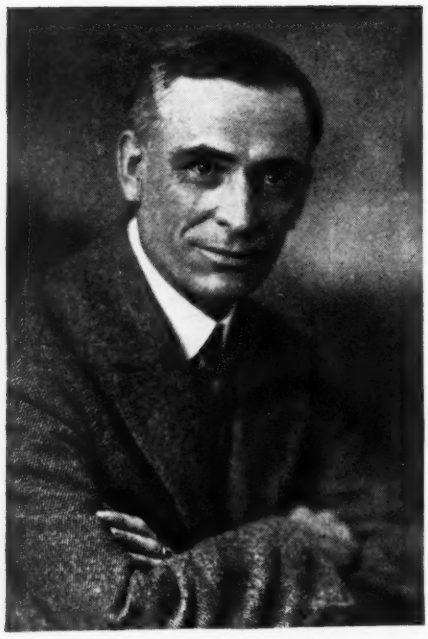
Graigrene reduces friction load 26%—increases gasoline mileage 5.5% per gallon—permits motor to deliver 7% more power!

Instruction books and automotive engineers advise against grease, recommend a free-running lubricant, such as Graigrene. Get your share of this big market—big profits—now!

Manufactured by

Viscosity Oil Company

W. D. SIMMONS, President
Central Manufacturing District
CHICAGO



DR. J. F. CONOVER

K. A. BUCK

Iowa Jobber Cuts Book Accounts By Readjusting Credit Policy

By Ward K. Halbert
N. P. N. STAFF WRITER

CALMAR, Ia., Feb. 24

BOOK accounts of the Tri-Star Oil Co., of Calmar, were reduced 50 per cent in three months by a carefully planned campaign of collection and, at last report from the field of operation, accounts were still being liquidated. The campaign was composed of three stages, carried out in the following order:

First: Quit putting out credit indiscriminately; devise a safe rule for the organization to work by, and enforce the rule.

Second: Collect quickly the money that is easy to collect, employing pleasant and easy methods through company employees.

Third: Go after bills that are doubtful and bad in a way that will be effective, using professional collectors when necessary.

Accounts receivable of the Tri-Star Oil Co., (good, bad and doubtful) had been growing for about three years. Wide operating margins sometimes obscure questionable accounts because a merchant is so busy selling he forgets to collect. But when margins get narrow and profits get thin, bad accounts show up more plainly. The officers of this company looked ahead and profited by it.

The strategic move was made early last November. Iowa farmers were estimating the value of their ungathered corn and merchants all over the state were beginning to look forward to the big annual settlement. It was then that the executives of the Tri-Star Oil Co. got their heads together for a look into their own affairs.

J. F. Conover, a doctor, banker and a man of letters, is head of the company but is not so intimate with detailed affairs as is K. A. Buck, general manager. Mr. Buck's figures for 1926 and ten months of 1927 showed a serious situation—serious but not yet dangerous. The story was this:

So far in 1927 Tri-Star Oil Co. had increased its gallonage 16-2/3 per cent over the first ten months of 1926 but gross cash receipts were off. The company seemed to be selling more goods for less money. Expenditures for merchandise had been running lower in 1927 but that was partly offset by the fact that additional equipment had been bought and more men had been employed. On the whole things did not look very promising.

ANALYSIS of the data showed two reasons for the shortage of income—one which they could not help and one which they could. First, margins were narrower in 1927. The spread per gallon on gasoline and oils in 1926 had been .0554 cents, and in 1927 only .0430 cents. As far as the Tri-Star Oil Co. was concerned the margin was 20 per cent (about 1 cent a gallon) less. That could not be helped. But accounts re-

An implement dealer in a small Iowa town converts the front of his store into a service station. Stocking a full line of oils and greases of the Tri-Star Oil Co., the merchant becomes territorial dealer in everything but gasoline and kerosene

ceivable had increased 100 per cent, and that *could* be helped.

Three or four years ago the company had not been alarmed to find $10,000 or even $12,000 on the books in the early fall. But in 1927 the figure had grown to nearly $32,000. Mr. Buck and Dr. Conover agreed it was too much and they laid a plan to reduce it. On Feb. 1, 1928, it had been cut in half. Better still, a new method had been devised for handling credits and collections.

The new credit system went into effect Nov. 1. All accounts older than that were declared delinquent. But before telling about the new system it is necessary to tell of the old credit system.

In former years the company supplied its salesmen and tank truck drivers all the credit information on customers it could get, each rated in a simple way. Salesmen extended at their own discretion, guided by the information from headquarters. They were accountable but not actually responsible for credit losses.

Farm credits are difficult. The office did the best it could getting information from implement dealers and small town banks and rated each farmer in one of four classes, designated, A, B, C and D. "A" stood for unlimited credit. "B" meant credit not to exceed $50. "C" class customers were allowed only one barrel on time, and "D" class customers were to be sold only for cash.

BUT the drivers, who were not responsible did not think it was necessary to ask for money from a man rated "A", so even the best customers let bills get too big. The "B" customers stretched their limit from $50 to $100. The "C" customers often negotiated a second and a third barrel of gasoline or kerosene. Even the C.O.D. crowd got some credit. It was under this system that accounts receivable grew from $12,000 to $23,000.

Under the new system all customers are divided into three groups, as far as the tank truck drivers are concerned. They are consumers, commercial accounts, and resellers. Consumers terms are cash, or maybe 30 days at the driver's risk. Commercial accounts have a $100 limit, and resellers get one fill and pay for it when the next fill is made.

If a tank truck salesman extends credit to a farmer he does so knowing he must pay the bill himself if the farmer fails, however he has 60 days in which to collect. If it is not paid in 30 days the salesman finds a notation of it on his monthly collection report from headquarters. And if he can't get it in another 30 days deduction is made from his check.

EACH month the collection report from the home office lists every one of the salesman's credit accounts. Names are listed and amounts are shown in two columns. They are "Amount Delinquent" and "Account to Date." The total of the delinquent column is deducted from the salesman's check. However, the check is accompanied by a bill for each amount. If the salesman is able to collect he can keep the cash.

The company is more lenient in the matter of commercial accounts. If the management authorizes a salesman to serve one of these accounts (a road or a building contractor, for example) the salesman is not responsible for the debt within the limits. However, if he lets the bill exceed $100 he is responsible. Deduction is liable against his check for the credit he extends in excess of the $100.

The most drastic terms are applied to reselling agents, such as garagemen and filling stations. The company allows them one fill, regardless of size. If the salesman on the truck delivers a second fill he gets paid for the first one, otherwise he is liable himself for the second fill. Time

ESTABLISHING a new credit policy based on the class of business, and making the salesmen financially responsible for violations of the policy, has reduced accounts receivable for the Tri-Star Oil Co. at Calmar, Iowa, approximately 50 per cent in three months.

The new system was put in operation recently to collect the delinquent accounts and to place a firmer grasp on future credits. Salesmen are not responsible for credits given within the established limits, but any over-extension is deducted from commissions. And the new system also has resulted in the company obtaining cash for all fills from resale accounts.

Staff writer Halbert in the accompanying article tells of this new system, and of how the Tri-Star Oil Co. operating organization is related to the new credit policy.

Three Credit Letters

FOLLOWING are the contents of three letters issued on company stationery by the Tri-Star Oil Co., Calmar, Iowa, to all salesmen outlining the new credit policy:

Consumer Trade

SELL FOR CASH ONLY! If you are called on to make a credit sale, you must be sure and explain to the customer that unless his account is settled in 30 days, same will be placed on your collection report, after which time it becomes deductible from your commission checks.

This policy has become imperative through the continued neglect of many customers to pay their accounts promptly when due.

It is our desire to function in the mutual interest of customer and ourself. This we cannot do unless we ourselves are successful.

* * *

Commercial Accounts

Threshers, graders, saw mills, graveling crews, etc. are the types of account covered by this ruling.

Sales shall be made for cash. Where this is impossible and with customers of approved credit, the Tri-Star Oil Co. will allow $100.00.

Be sure to explain to the customer that any amounts he may contract in excess of this $100 *will be placed on your collection list immediately and will be deductible thereafter from your commission checks.*

Explain also that the whole amount shall be paid at least each 90 days irrespective of the credit allowance.

* * *

Resale Trade

Your resale customers are your trade who buy for resale. Your service stations, garages and stores. To this class of trade the Tri-Star Oil Co. will extend credit of one fill. This fill may be 100 gallons or it may be a full load, the understanding is that this said load shall be paid for when the next delivery is made.

Most every reseller nowadays gets cash for his gasoline, and surely will be well taken care of by the above practice.

does not enter into it. The same rule applies whether fills are 30 days or three hours apart. If he sells the merchandise and needs more he is supposed to have gotten some money for it.

Naturally, no truck driver is going to get caught for a complete fill at a service station. The bill is too big to take a chance. Mr. Buck says no such deduction has ever been made from a truck driver's check.

THE practicality of this system will be understood better in that all Tri-Star Oil Co.'s tank truck men are salesmen in every sense of the word. Each one is in charge of a branch bulk station and owns his own truck.

Each driver is paid entirely on a commission basis with no guarantee. He gets 1 cent a gallon on gasoline and kerosene delivered in town, and 1.8 cents in the country. Besides, he gets 5 per cent commission on all oil and grease sales in his territory no matter who sells it. The company lends him a truck tank and supplies the fuel, but the driver buys his motor oil at wholesale and keeps his truck in repair.

The company has bulk stations operated in this way at Castalia, Monona, West Union, Hawkeye and Maynard besides the station at Calmar. The man in charge at each bulk station sells the company's complete line, delivers and collects. But he does not run the warehouse nor handle the oil stocks. Obviously he could not because he cannot spend enough time in one place. That work is done by somebody else.

In every one of these towns the company has a "Full Line Dealer." Usually this dealer has a store, preferably an implement store or a garage with a good location in town and a good business reputation. This dealer has a couple of the company's gasoline pumps in front of his place and a complete stock of motor oils and greases in stock.

When the salesman goes out on his route with his truck of gasoline and kerosene and sells a farmer a drum of motor oil, the motor oil comes out of the store of the full line dealer. The dealer gets his profit and the salesman gets his 5 per cent commission. The commission and profit arrangement is the same if a farmer comes to the store, buys the goods and hauls it home.

Thus the salesman on the tank wagon and the dealer in the store have interests in common. They pull for one another and thereby boost the sale of lubricants. The salesman gets his mail at the store. The dealer takes care of his telephone calls and messages from customers. It is the same result as if the dealer had an oil salesman out working for him and the salesman had a good man working in his office.

If there is another filling station or garage in town selling Tri-Star Oil Co.'s products, it is an ordinary discount agreement basis. The gasoline pumps in front of the dealer's establishment are likewise on the q.d.a. basis.

Sometimes special sales campaigns are handled (through special arrangements with the dealer and the salesman) by the home office at Calmar. But for the ordinary run of business the tank truck driver is a salesman in every sense, and the man who stocks the complete line of lubricants is in every sense a dealer.

There are some "Full Line Dealers" in towns where there is no bulk plant. These dealers do not have the undivided help of a salesman but they are assisted occasionally by Mr. Buck or his assistant, Roy Sherren, who go into his territory and help out with sales. If a tank truck comes into this town from another town, the driver has to use his judgment and not play favorites. When he sells a drum of oil or a can of grease he must know whose stock it should be taken from.

However the company does not place the responsibility of collecting on the salesman's shoulders and leave him to his own devices. Each salesman gets help from headquarters.

When Nov. 1, 1927 was made the dead-line, and the new credit system placed in effect that day, each salesman was given instructions about how to liquidate old bills. The three letters accompanying this article are from the home office to the salesman, bound in a folder so the salesman can show them to his customers. The letters say plainly that delinquent accounts are deducted against the salesmen's commissions. And it helps.

THERE is an idea in the minds of some farmers that any sizable corporation has plenty of money and can wait indefinitely for its pay. They are much prompter to pay bills of a private nature. These letters had the effect of making their delinquent oil bills a personal matter between them and their friend the tank truck driver. The letters helped collections.

The salesmen were charged with the responsibility of collecting everything for September and October—two months prior to the time the new system went into effect. The company took the responsibility for collecting older bills.

Farmers' old bills were not so hard to collect as ancient accounts with irresponsible resellers and bankrupt commercial firms. Some of those were impossible but most of the farmers were good, but slow. Farmers were prepared for what was coming by the extra effort of the tank wagon man to get his money for September and October. In many cases when they paid for those two months the farmers paid in full.

Mr. Buck and Mr. Sherren vigorously went after those who did not pay. They worked the territories around every bulk plant. They made personal and telephone calls and wrote letters. In especially bad cases they called in a collection agency. Mr. Buck says, under his new system, accounts receivable will never get in the neighborhood of $10,000 again.

70c is World's Highest Gasoline Price Now

WASHINGTON, Feb. 25.—Substantial reductions in the retail price of gasoline in many cities in foreign countries during 1927, as compared with 1926, are shown in a report on the world's retail gasoline prices published recently by the Bureau of Foreign and Domestic Commerce.

Among some 100 more important cities of the world, the highest retail price of gasoline as of Dec. 31, 1927 was 70 cents, as compared with highest price of 79 cents on Dec. 31, 1926. The 70 cent price for 1927 was in effect at Guatemala City, Central America and at Bogota, Colombia, as compared with 67 cents and 69 cents respectively on Dec. 31, 1926.

At Tananarive, Madagascar, in 1927 it cost 21 cents per gallon less to burn up roads with a Ford. On Dec. 31 retail price had fallen to a mere 58 cents, from 79 cents at the end of 1926.

Price at Teheran, Persia, which ranked second in 1926 in high prices, fell off 3 cents to 68 cents on Dec. 31, 1927, compared with 71 cents a year ago.

Bucharest, Roumania, which had the lowest price at the end of 1926 in this group of cities, had increased its price 8 cents during 1927 so that gasoline retailed for 22 cents there at the end of the year.

A comparison of prices for 1927 and 1926 at cities where they were highest during 1926, besides Guatemala City, Bogota, and Teheran, follows:

	1927	1926
Nairobi, British East Africa	64c	70c
Johannesburg, British South Africa	58	70
La Paz, Bolivia	58	62
Tegucigalpa, Honduras	62	59
Teneriffe, Canary Islands	32	56
Loanda, Angola	41	54
Belgrade, Yugoslavia	47	54
Seoul, Chosen	41	51
Tunis, Tunisia	30	24

Prices at the important world centers at the end of 1927 and 1926 were:

	1927	1926
London	23c	28c
Paris	32	32
Berlin	28	28
Vienna	25	30

Lowest prices on Dec. 31, 1927 were at Porto Rico, San Juan, and at Toronto, Ont., both points having a 19 cent retail price. All prices are exclusive of taxes.

Effect of Repressuring Producing Sands During Flush Stage of Output

By E. V. Foran*

Presented before Petroleum Division, A. I. M. E., New York, Feb. 22

THE repressuring of oil producing formations during the flush stage of production, although requiring primarily the same procedure of operations on formations where the gas pressure has been depleted, offers several advantages of major importance, the value of which have not heretofore been demonstrated. It is the purpose of this paper to present an account of some recent operations of this character and the economic effects on the properties where they were applied.

The principal objective in all repressuring operations is to secure an effective diffusion of the input energy to all parts of the producing sand. If this can be accomplished, success is assured during the remainder of the life of the property, otherwise it will be temporary only and followed by difficulties, and the maximum possible recovery will not be obtained.

During the past year in Texas, the Cook pool in Shackleford county, and the Turbeville pool in Archer county, while still in their flush stage of production, have been subjected to repressuring operations to observe their reaction to this process during the early stages of their productive periods. The repressuring operations carried on in each of these pools will be discussed separately in this paper in order to show peculiarities which were present in one pool but were not observed in the other.

Turbeville Pool, Archer County, Texas

THE Turbeville Pool is in Archer county, about 30 miles south of Wichita Falls. The productive sand varies in thickness from 10 to 30 feet, the average being about 16 feet. The depth of the sand varies from 1450 to 1530 feet. The developed productive area to date is approximately 200 acres, but the limits of the pool have not yet been proven. The sand varies considerably in different parts of the pool with respect to both porosity and permeability. The gravity of the oil varies from 39 to 41 A.P.I. There were some wells which flowed for a few days after completion but, during 1927, all production was secured by pumping. The initial gas reserve was very small and its depletion was marked by a very rapid decline. There are six operators in the pool and to simplify reference to the map, the leases will be designated by alphabetical letters. (See accompanying Fig. 1).

Preliminary Survey

During the latter part of May, 1927, the Marland Oil Co. made a preliminary survey of subsurface conditions to determine the natural distribution of the gas in different parts of Lease B. Results of this survey showed the gas-oil ratio to be fairly uniform throughout the lease, which fact was interpreted as favorable to repressuring operations. The natural ratio at that time was 270 cubic feet per barrel. No rock pressures were determined during this survey, but it was estimated that the original rock pressure was probably not over 225 pounds.

There were several wells on Lease B which were completed in areas where the sand was very tight and these wells made small initial production, which was followed by a very rapid decline. It was deemed advisable to use these tight sand wells as input or key wells wherever possible and drive the oil from the tight sand areas to the loose sand areas where recovery was certain to be made. This led to the selection of a tight sand input well which was centrally located in Lease B. Although there was a surplus of gas available at this time, it was decided to introduce air into the input well the first 30 days and analyze the output gas from the surrounding wells to determine the path of the input air and its degree of diffusion and range of influence in the different directions in which it traveled.

Equipment

This was equipped with a 150,000 cubic foot daily capacity, two-stage, portable compressor, which remained in service until results indicated that success was assured. The input air to the key well was measured daily through an orifice meter. This compressor was replaced after 35 days' operation by an 80 horsepower two-stage compressor, which was installed for permanent operation, at which time also gas gathering lines were laid to the casingheads of all the producing wells and meters installed at the compressor intake and output to record distribution and consumption of gas.

Operating Data

Active operations were started on June 4, 1927, when 70,000 cubic feet of air daily was forced into the sand through input well No. 1. The rock pressure on Lease B at this time based on fluid level observations was approximately 90 pounds and the pressure required for the sand to absorb 70,000 cubic feet of air daily was 185 pounds. As this was the first attempt at repressuring in this pool, together with the fact that it was still in the flush stage of production, it was impossible to forecast any probable results. Recording measurements were made daily on the volume of gas from each of the first and second line wells surrounding the input well. Daily oil gauges were also obtained from each of these wells from which gas was being measured.

Just prior to the introduction of the air, Lease B was producing 450 barrels of oil and 128,000 cubic feet of gas daily. This showed a gas-oil ratio of 285 cubic feet per barrel.

Results of Air Drive

DURING the first ten days following the injection of the air, some slight increases in oil and gas were observed, but were not regarded as being of any importance. The output of gas from all wells was analyzed daily for any traces of air that might be detected but none were observed, although more than 700,000 cubic feet had entered the sand during this ten-day period. However, the second day of the period following the injection of air showed some marked increases in both oil and gas production. These increases extended in two directions, one location to the east, and two locations to the west of the input well. A careful analysis for air showed no traces present. No changes were made with respect to the volume of input air which was entering the sand, as the increased production on each side of the input well indicated that a satisfactory distribution was being obtained.

At the end of the first 30-day period of operations, the range of pressure influence had extended be-

*Production engineer, Marland Oil Co. of Texas.

yond the boundaries of Lease B both to the east and west of the input well. The influence to the west seemed much more marked than to the east. The persistent increases in oil and gas production in this direction were interpreted as indicating a rapid migration of the air westward. As a desirable counter force to act against the migration of too much air in this direction, the tubing of those wells which showed the greatest increases was raised 20 to 40 feet above the customary level which was the top of the sand. This resulted in a sudden drop in production in these wells due to the low rock pressure and this practice was abandoned and instead, the volume of input air was reduced to a point which was insufficient to extend its influence beyond the borders of the lease.

Recirculation of Wet Gas

On July 9, the portable air compressor was shut down and the casinghead gas was delivered to an 80 horsepower two-stage compressor which returned 50,000 cubic feet of wet gas to the input well. No attempt was made to extract any gasoline from the gas as this would require condensing coils and absorbers and it was also considered an advantage to return wet gas to the sand as this would retard the natural tendency of the remaining oil in the sand to become increasingly viscous due to its otherwise constant contact with circulating dry gas or air. The recirculated wet gas showed 2.1 gallons of gasoline per 1,000 cubic feet.

IMPORTANT data on a new phase of production engineering research is afforded in the accompanying A. I. M. E. paper prepared by E. V. Foran, of the Marland Oil Co. of Texas. Discussion of this paper brought out that repressuring with air or gas during the flush stage of production of an oil pool may not only serve the ends of conservation and greater operating efficiency; but also that this method, when using air, offered great possibilities for securing data as to rate of diffusion of sands, direction of flow of the oil and so on.

During the period from June 4 to July 9 inclusive, there was a total of 2,404,000 cubic feet of air injected into the sand through the No. 1 input well, but no trace of it was found during this period. During the latter part of July, the tubing levels were raised again in an attempt to allow the return of greater volumes of gas to the sand without encountering the dangers of "by-passing" or "channeling." This result was not successful due to the rock pressure being too low to even produce oil against a fluid head of only 20 or 30 feet.

Velocity and Diffusion of Air and Gas in Sand

On July 29, 55 days after the start of operations, air was detected in the casinghead gas from the well one location (300 feet) to the east of the input well. This was followed by the appearance of air in two more wells to the northeast of the input well, one on July 31 and the other on Aug. 2. The air content of the gas from these wells varied from 6 to 12 per cent during the first

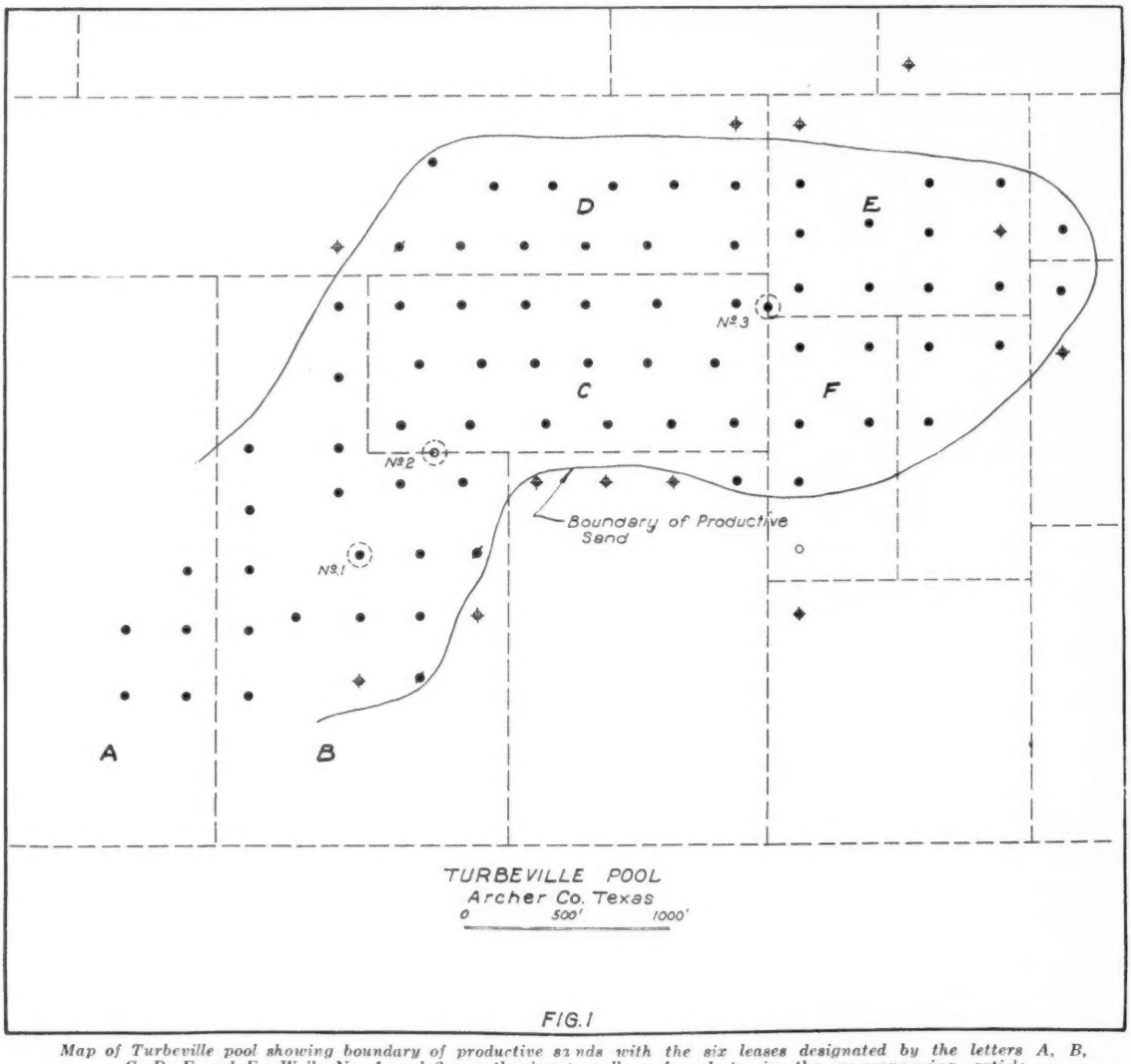


FIG. 1

Map of Turbeville pool showing boundary of productive sands with the six leases designated by the letters A, B, C, D, E and F. Wells No. 1 and 2 are the input wells referred to in the accompanying article

three days' appearance and reached its peak about 10 days later, showing 23 per cent on one well, 16 per cent on another and 9 per cent on the third well.

The path of the air (See Fig. 2) was fan-shaped, radiating from the input well in a general northeastward direction. The average velocity of the air in its course to the nearest well was approximately 6 feet per day. Undoubtedly the velocity of the air close to the input well was much greater than this, but, due to progressive diffusion and radiation, its velocity became very slow before appearing in the offset wells. The air content in the three wells mentioned, remained from 4 to 9 per cent for 40 days following the first appearance. This is further indication of complete diffusion of the air in the formation.

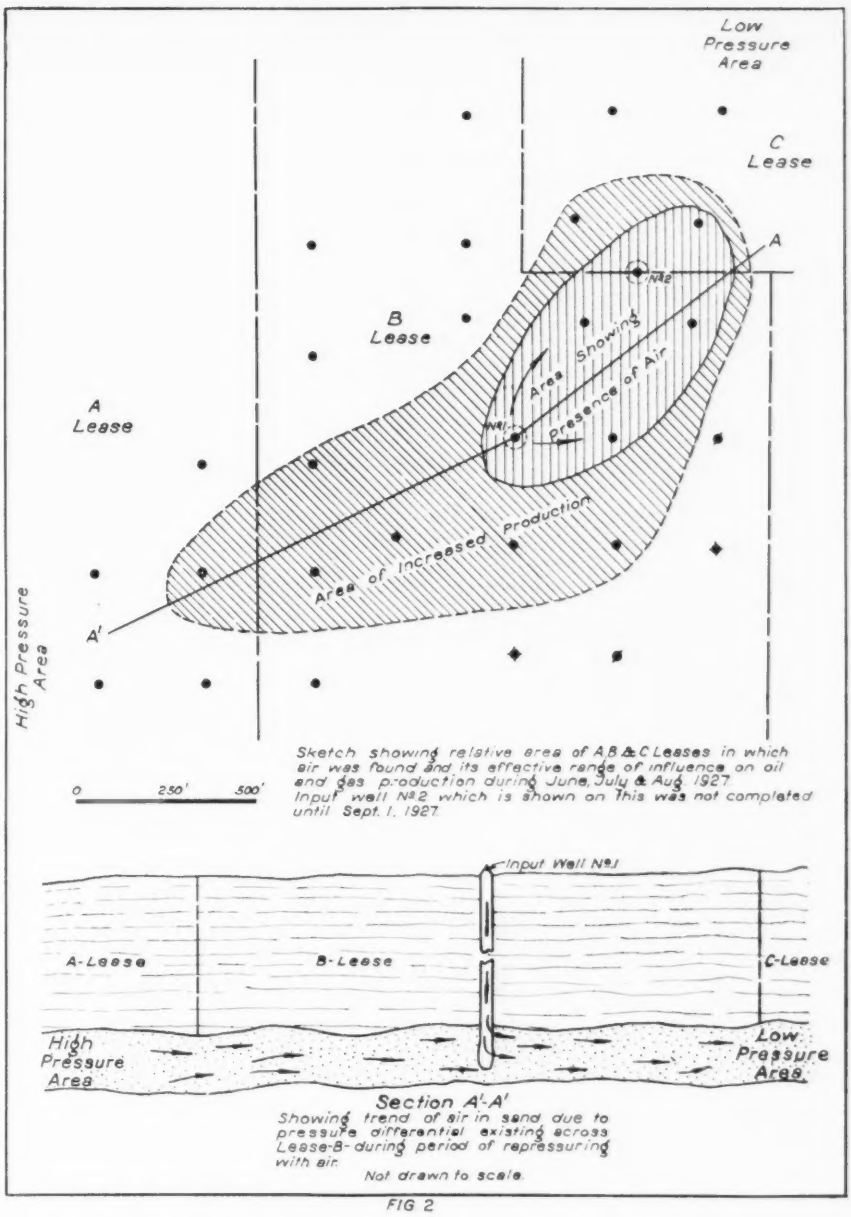
Although the casinghead gas from each of the wells to the west of the input well was carefully analyzed for air during the period June 10 to Dec. 31, no trace was found in any of them. In spite of this fact, these wells showed the greatest increase of gas and oil production during the period of repressuring.

Natural Migration of Gas and Oil

After mapping the course of the air in the sand (Fig. 2) and noting its effects, it at once became apparent that the increased production to the west of the input well was the result of blockading an active stream of oil and gas whose origin was somewhere in Lease A, which is known to be the area of highest pressure in the pool, to areas of lower pressure which are known to exist to the east of Lease B. The rock pressure during this period at input well No. 1 was known to be 70 pounds, while the pressure at input well No. 2 (completed Sept. 1) was 30 pounds. From this data it was assumed that the rock pressure on Lease A was probably 90 to 100 pounds per square inch. This would indicate that a pressure differential of 60 or 70 pounds per square inch was sufficient to cause an appreciable drainage of oil from Lease A to areas of lower pressure, although there were first and second line wells completed on this lease for protection against such drainage. The wells on Lease A were the last in this pool to be completed before the suspension of development operations in April 1927. The productive limits of the pool had been reached in all directions except to the west of Lease A.

Had gas been used as an input medium during the first 35 days instead of air, the increased gas and oil production to the west of the input well would have been interpreted as evidence of the input gas going in that direction whereas the exact opposite was proven to have occurred.

On Sept. 1, a "five spot" input well, to be owned and operated jointly by The Texas Co. and the Marland Oil Co., was completed on the boundary line of the B and C leases. The Texas Co., operators of Lease C, completed a repressure p'ant on Sept. 5 and in October completed a second "five spot" input well on the east border of Lease C. Air was injected into input well No. 2 on the B and C lease boundary line for a period of seven days, after which it was replaced by wet gas. The air was observed to move rapidly eastward through the sand, which was expected since the lowest pressure area was known to be in this direction.



Sketch showing relative area of A, B & C Leases in which air was found and its effective range of influence on oil and gas production during June, July & Aug. 1927. Input well No. 2 which is shown on this was not completed until Sept. 1, 1927.

FIG 2

The following tables show the average daily volumes of input and output gas on Leases B and C, together with the production data for their respective periods of observation before and during repressuring operations, to Jan. 1, 1928.

Month	Cu. Ft. input gas	Cu. Ft. output gas	Net gas from sand	Net formation Bbls. oil	Ft./Bbl. ratio	Remarks
May	None	145,000	145,000	540	268	Normal operations
June	74,000	123,000	49,000	454	108	Repressuring with air
July	42,000	95,000	53,000	440	120	Repressuring with wet air
Aug.	38,000	80,000	42,000	415	101	Repressuring with wet air
Sept	91,000	76,000	None	337	0	Attempt to restore pressure
Oct.	86,000	88,000	2,000	299	7	Raised tubing levels
Nov.	47,000	100,000	53,000	306	173	Lowered tubing to normal
Dec.	59,000	106,000	47,000	290	162	Normal repressuring

In studying the above table it will be noted that, during the months of September and October, there was no loss of gas from the subsurface reserve, as increased quantities of air were forced into the sand in order to increase pressure in the sand,

while extracting normal production from it at the same time.

There was no by-passing, due to high fluid levels maintained on the B lease. The only reaction was a sharp increase in production on the C lease as this was a lower pressure area than the B lease. Although the line wells on the C lease were subjected to high back pressures they did not form an effective barrier against the large volumes of input gas and air forced in the "five spot" well on the B and C lease boundary line.

Month	Cu. Ft. input gas	Cu. Ft. output gas	Net gas from sand	Net formation Bbls. oil	Net formation Ft./Bbl. ratio	Remarks
Aug.	None	90,000	90,000	575	172	Normal operations
Sept.	45,000	85,000	40,000	555	72	Repressuring wet gas
Oct.	83,000	110,000	27,000	639	42	Repressuring wet gas
Nov.	82,000	105,000	23,000	577	40	Repressuring wet gas
Dec.	65,000	90,000	25,000	540	46	Repressuring wet gas

A study of the tables on both of the leases mentioned above shows at once how the repressuring of flush pools offers a possible solution for the conservation question, which, although widely discussed, has remained unsolved to date.

Utilization of Wet Gas

All repressure operations on both the B and C leases are being carried on with wet gas and no attempt is being made to condense any of the vapors from the compressor output gas. The stock tanks on Lease B are kept at a pressure of one half ounce below atmosphere by means of a sensitive vacuum regulator, which delivers the vapors to the compressor for return to the sand. Under these conditions, there is absolutely no vapor losses either in winter or summer whether the tanks are vapor tight or not. If the tanks are not vapor tight, a small amount of air may enter the lines but no gasoline vapors can be lost to the air. It has also been observed that the recirculation of wet gas is the only method by which the oil reaches the tanks at the maximum possible gravity. Also when repressuring any producing formation at relatively low pressures, as is the case in the Turbeville pool, it becomes a valuable asset to return the gas as wet as possible, as the oil is capable of absorbing and retaining in solution considerable quantities of wet gas even under pressures of only 70 or 80 pounds whereas residue gas or air would remain largely in the free or possibly occluded state in its relation to the oil.

Effect in Water Encroachment

An increase in bottom water was observed following the rapid decline in production on both the B and C leases. Soon after the beginning of repressure operations on the B lease, the water disappeared entirely in some of the wells where it has been present, and in the other cases further encroachment was entirely arrested. During the period from June 1927 to Jan. 1928, there was no increase in water production from this lease. The C lease shows a similar history with respect to water.

Ultimate Production

The relative increases in daily production observed from repressuring during the flush stage are not as pronounced as those generally observed where these operations are delayed until the point of economic exhaustion is reached by normal methods. However, the actual net gain in barrels per day and ultimate output are greater, and also the time factor required to produce oil is reduced.

The following table shows relative production data and the rise in indicated ultimate production from the two leases due to the repressuring process. Fig. 3 shows graphically the effect on the production decline of these leases due to these operations.

The higher investment figure noted on the B lease was due to the use of oversize compressor equipment, as this was available and was transferred from another lease to avoid the necessity of purchasing new and lower cost equipment more suitable in size for the operations on this lease. All of the equipment on the C lease was new.

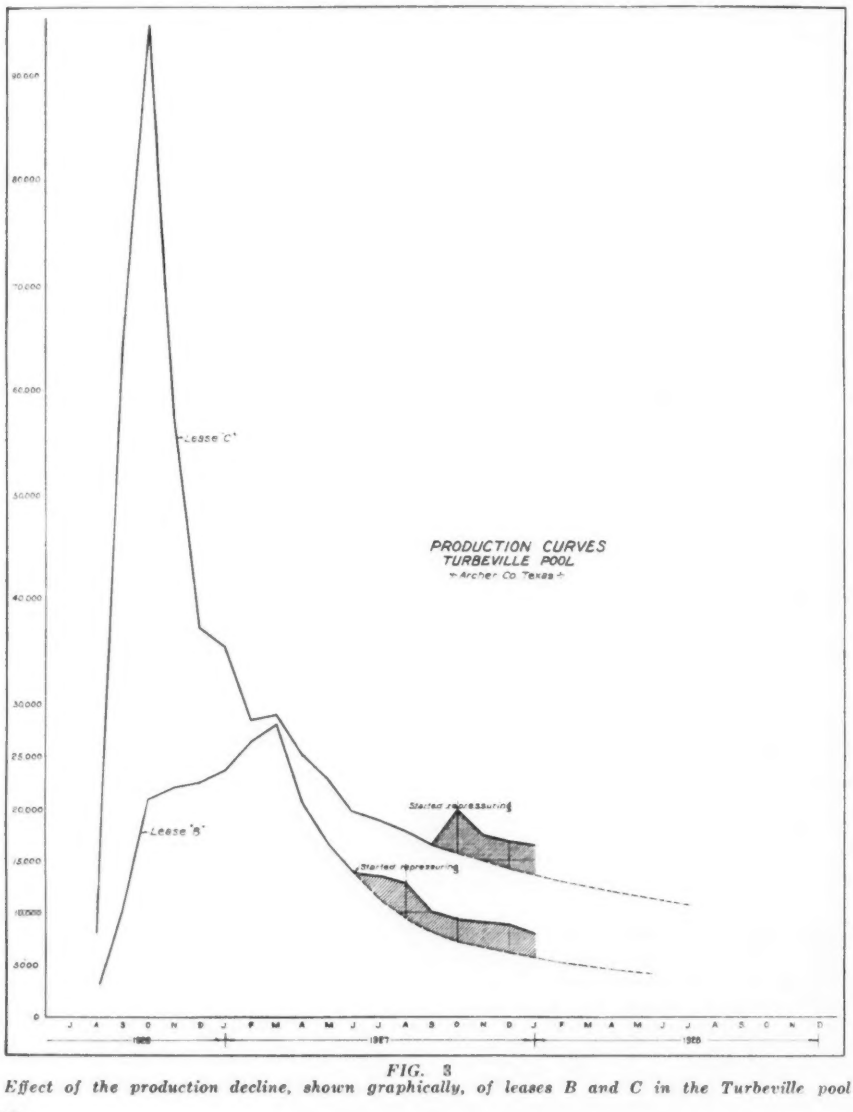

PRODUCTION CURVES
TURBEVILLE POOL
Archer Co. Texas
Lease 'C'
Lease 'B'
Started repressuring
Started repressuring
J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D
1926
1927
1928

FIG. 3
Effect of the production decline, shown graphically, of leases B and C in the Turbeville pool

	Lease B	Lease C
Number producing wells	15	18
Number acres productive sand	44	38
Monthly peak production	28,096	94,848
Total bbls. production prior to repressuring	192,300	459,030
Bbls. normal indicated ultimate production	290,000	.....
Bbls. indicated ultimate by repressure process	380,000	.....
Bbls. net ultimate increase	90,000	.....
Bbls. per acre yield to Jan. 1, 1928	6,130	14,300
Bbls. per acre yield ultimate	8,650	.....
Investment in repressure equipment	$12,000	$8,000

It will be noted from analyzing the data on Fig. 3 that the B lease repressure investment was returned during the first five months of operations and the C lease investment in less than four months of operations. This was accomplished with

the price of 40 gravity oil at $1.36 per barrel.

Cook Pool—Shackleford County, Tex.

Development Prior to Repressuring

THE Cook pool is located in Shackleford county about six miles north of Albany. The producing sand in this pool is classified as a member of the Cisco series found at a depth of from 1100 to 1350 feet. The sand varies in thickness from 6 to 30 feet, averaging about 20 feet. The structure is well defined, showing a known area of dry gas sand of about 15 acres which occupies the high portion area of the main producing sand. The known productive area of the principal sand was approximately 1000 acres on Jan. 1, 1928. The well spacing is 300 feet.

Development Prior to Repressuring

The first production from the pool was obtained in March 1926, and from this time until March, 1927, development was very rapid. During this period, more than 200 producing wells were completed in the pool, leaving a large favorably located area still undeveloped. A few of the wells flowed for a period of 60 to 90 days following completion, but due to the lack of high initial rock pressure, 90 per cent of the completions were pumpers. The initial daily production of the wells varied from 30 to 1,500 barrels, averaging about 125 barrels. The gravity of the oil varies from 37 to 41 degrees A.P.I. There are six companies operating in the pool, but Roeser & Pendleton, Inc., Roeser & Pendleton-Marland, and the Humble Oil & Refining Co., are the only operators who are repressuring their properties.

Preliminary Survey

DURING April 1927, a preliminary survey was conducted by Roeser & Pendleton-Marland for the purpose of indicating the possible advantages of repressuring the pool while still in the flush stage. The gas-oil ratio was observed to vary 350 to 1300 cubic feet per barrel, averaging about 900 cubic feet. Average daily production at this time was 7,700 barrels.

A representative area in the south part of the pool was chosen for a repressure test and operations were started April 9, 1927. The area in which the tests were carried on showed a rock pressure of from 90 to 110 pounds per square inch, these pressures being determined by pressure gauges submerged to the bottom of the full static column of oil. Although an abundance of gas was available at the start of operations, air was injected in the sand for ten days through a well which had been a regular producer, but which was temporarily killed in order to serve as an input well. The input well was surrounded by eight producing wells, four being direct offsets and the other four diagonal offsets.

A two-stage portable compressor served to inject the air into the sand and the meters showed that a total of 770,000 cubic feet of air had entered the sand the first ten days. The input pressure required was 165 pounds. The air was then discontinued, and residue gas returned to the sand during the remainder of the test period.

Results of Preliminary Tests

Increases in production of the surrounding wells were observed on the sixth day following the start of operations. The casinghead gas from the surrounding wells was analyzed for air during the next 40 days. The air appeared in six of the wells in a highly diffused state, which was indicated by the fact that the air content of the gas did not exceed 4 per cent at any time during the 21 days that it was present as a component of the output gas. The air made its first appearance 14 days following the start of operations and disappeared 35 days after the start. There was no evidence of "channelling" and the ratio did not change from that of the normal pretesting period. The input air and gas entered the sand during the period April 7 to May 5, 1927.

Permanent Equipment

Following the preliminary work, a permanent plant was installed in July which is capable of handling 4,500,000 cubic feet at the required pressures to return the residue gas from a casinghead gasoline plant to the sand. This plant started operations July 13, 1927, and has been in continuous operations since. The compressor equipment, together with field lines, meters, etc. represents an investment of $80,000. This equipment is the joint property of Roeser & Pendleton and the Marland Oil Co., whose properties produce nearly 95 per cent of the production from this pool. This plant also delivers gas for repressure purposes to the Humble Oil and Refining Co.'s 80-acre lease.

The compression plant during the prorate period handled an average of 1,050,000 cubic feet per day and distributed it to the input wells through 14 volume control Orifice meters. The average daily wet gas production from the pool during the prorate period was 2,900,000 cubic feet.

Method of Operations

ON ACCOUNT of the ownership status of the leases in this pool being similar to that where unit control prevails, the greater portion of the production has been shut in since May, 1927, the lease line wells and those which are in the zone of water encroachment being the only ones from which production has been extracted at normal capacity, the remaining wells being produced at not more than 30 per cent of their normal capacity during this period. As a result of being on a prorate basis while being repressured, it is difficult at this time to forecast the effect of repressuring on the ultimate recovery from this pool, but the

Conclusions of Repressuring Experiments On Turbeville and Cook Pools, Texas

1. The repressuring of producing sands during the flush stage of production is the only method by which water encroachment can be retarded to any appreciable degree. Maintaining high back pressures without repressuring may prevent local "coming" of bottom water but will not retard progressive encroachment.

2. The flush stage is generally the only time during the producing life of the pool when an adequate supply of cheap gas is available for return to the sand. Air, which is always available, cannot be used in some cases, due to its corrosive action.

3. When repressuring permits the pumping of wells under moderate back pressures, as in the case of the Cook pool, a large quantity of dissolved gas remains in solution in the oil until after it has reached the well. This results in a lower viscosity of the oil and therefore, higher ultimate recoveries.

4. The use of wet gas is an advantage over dry gas, especially when repressuring at low pressures, due to its higher solubility in oil than dry gas under these conditions.

5. Fewer wells will be required to recover the oil from any unit area when that area is subjected to repressure operations during the flush stage.

6. It is proven beyond all doubt that conservation of gas energy in any producing sand increases the ultimate recovery from that sand.

7. The repressuring of producing sands during the flush stage of production offers a method by which true conservation may be applied on a dividend paying basis.

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observations that have been made to date are indicative of a degree of success that promises to recognize repressure operations in flush pools as a forward step in production methods.

In January, 1928, during two periods of brief duration, there were two 80-acre leases subjected to unrestricted production tests. Both showed a 25 per cent increase over the rate of the last former unrestricted production, which was gauged before the proration plan was adopted. The duration of these tests was four days on one lease and seven days on the other. There was no evidence of gas "channelling" during this test. During the period July 13, 1927 to Jan. 15, 1928, there was a total of 185,000,000 cubic feet of residue gas returned through the 14 input wells. This represented 38 per cent of the total wet gas production for the same period. The pressure required to return this gas to the sand varied from 60 to 170 pounds. The initial rock pressure of the Cook pool is not known, but was probably around 250 barrels.

Back Pressure Control

SEVERAL methods were tested out as a means of controlling the gas-oil ratio, which at times becomes so high that it threatened the success of the entire project. Tubing levels were raised progressively to allow a fluid column to constantly remain against the sand and act as a back pressure, but this was not satisfactory, for two reasons. First, while this insured a column of oil against the sand, the variations in the weight of this column in small wells due to pumping off, often unbalanced the pressure equilibrium at the bottom of the well and the gas would break through and become difficult to control.

Second, it was not considered good practice to follow, in cases where bottom water was being produced with the oil, as the water would tend to concentrate in the lower part of the well and constantly cover the sand. A liner with a packer which forced all gas and oil to first go downward to the bottom of the hole before its escape into the casing was also tried as a means to reduce the gas-oil ratio, but was unsatisfactory.

Finally it was decided to leave the working barrel at the normal position above the top of the sand and adjust the length and speed of the stroke in such a manner that the producing formation would never be uncovered, but there would always be fluid at a sufficient elevation above the top of the sand to constantly maintain the desired pressure. The plunger displacement was adjusted to that point which was observed to give the lowest gas-oil ratio consistent with the production obtained. This method has been previously tried as a remedy for troubles in the repres-

sure work in the Turbeville pool where it gave instant success, and when likewise applied to the Cook pool, it was equally successful.

Rod line multiplier posts are being installed on all wells which permits the adjustment of the plunger displacement to a very fine degree. In cases where the wells are small, a working barrel of small diameter is used. This method enables the operator to obtain a remarkable stability of pressure conditions in the sand and a positive control of the movements and distribution of the gas through the sand. After the proper speed and length of stroke for a well is determined, it requires little or no further attention.

Russian Petroleum Exports To Europe Increase

NEW YORK, Feb. 27.—Petroleum equipment amounting to $4,799,682 was purchased for use in Soviet Russia from the United States in the fiscal year ended Sept. 30, 1927, by the Amtorg Trading Corp., largest of the Soviet purchasing companies in New York. Petroleum equipment was first in the list of industrial equipment purchased in this country.

Exports of petroleum products across European borders from Russia last year increased 19.18 per cent over the year previous, on a value basis. In 1925-26 Russia exported 1,422,800 metric tons valued at $35,757,495 and 1926-27 exports were 2,005,100 metric tons valued at $42,615,569.80; in these computations a ruble equals $0.5146.

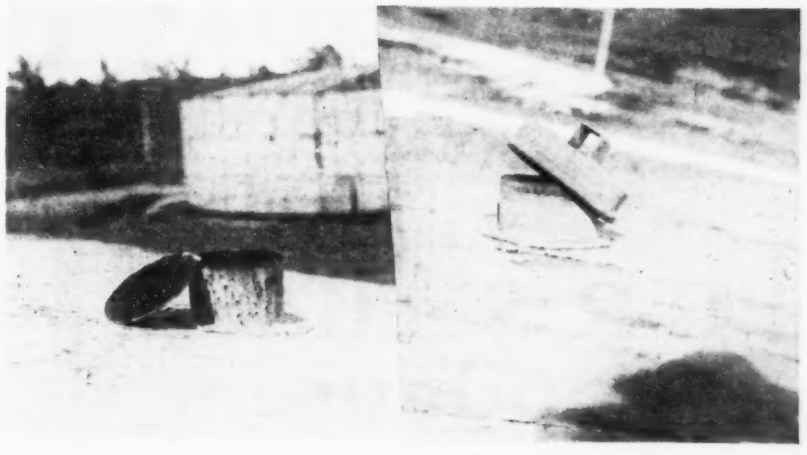
Petroleum exports to France were 179,412 metric tons in 1925-26 and 386,068 in 1926-27, an increase of 115 per cent. In 1925-26 petroleum valued at $1,141,850.06 was exported to England, as against $1,627,788.38 in 1926-27, a gain of 4.25 per cent. Norway last year received petroleum products valued at 700,000 crowns.

Exports to Persia in the fiscal year of 1927 were 35,253 metric tons, valued at $1,895.79 and to Turkey 45,028 tons worth $1,090.44.

Petroleum exports across Asiatic borders in 1926-27 amounted to 80,816 metric tons, or $3,293.44.

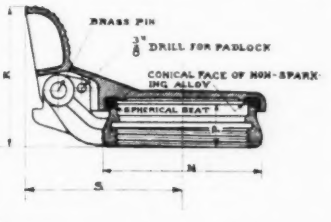
WASHINGTON, Feb. 27.—Although there may be a popular impression to the contrary the words "oil industry" do not connote a mass of crooked men who lack a sense of honor or decency, any more than the words "the ministry" mean a like conglomeration because some ministers of the gospel are bad. The oil industry, Representative Howard of Tulsa told the House of Representatives a few days ago, is honorable and patriotic and not unlike other activities in which Americans engage.

Mr. Howard represents a district in which there are more representatives of the oil industry than in any other district.



Only A Few of These Left

An open gauge hatch on a large tank can *lose* by evaporation the cost of a self-closing hatch *every day* that it is left open.



And when openings are not closed, even a good roof is no protection against fire and evaporation.

Consequently an old style gauge hatch is a most expensive thing to leave on a tank —and usually costs more in the first place than an Oceco

—self-closing, gas-tight, non-sparking; no liquid seals, gaskets or springs to make trouble.

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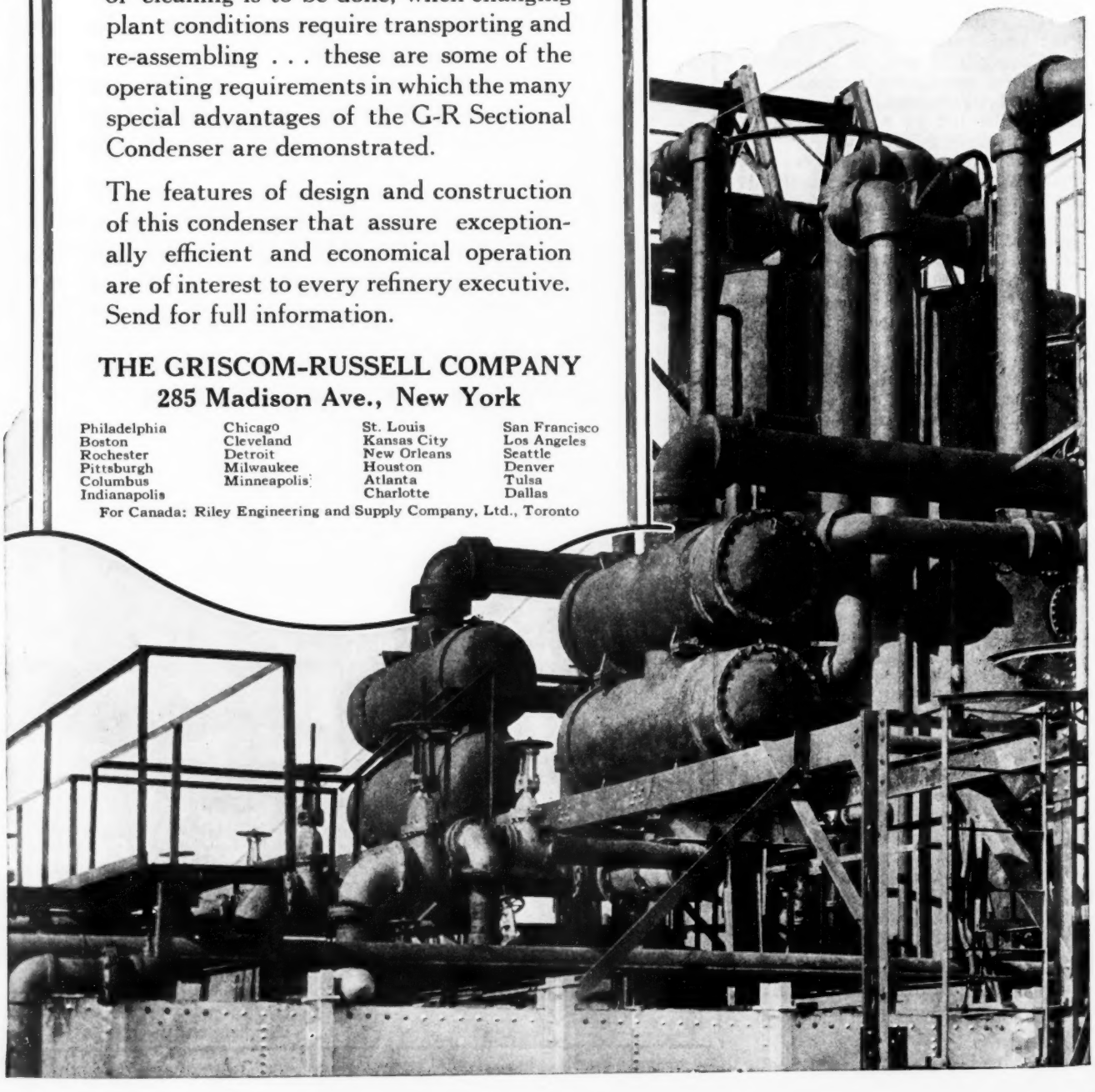


The Shell Still, Inside or Outside Fired, As a Big Volume Distilling Unit

By C. W. Stratford

Part 1

Presented before Petroleum Division, A. I. M. E., New York, Feb. 20-23

SEVERAL years ago, the Associated Oil Co. decided to improve distillation methods with the object of reducing refining costs. This extremely interesting work was entrusted to the writer. As the principal collaborator W. S. James, now chief of research of Studebaker, was chosen and he contributed much during his two years' stay, to the development work that has followed.

Appreciation is hereby expressed to the Associated Oil Co. for permission to make disclosures of the details of distilling equipment.

In petroleum refining the principal requisites of good economics are the separation of high-priced distillates from those of lower price; maximum yield of any desired distillate; lowest capital investment in refining equipment; lowest cost of operation and maintenance; and the best adaptability and flexibility of the same refinery equipment for handling crudes of widely varying characteristics.

The first two items mentioned, separation and yields of distillates, are determined by efficiency of fractionating equipment. Discussion in this paper is chiefly concerned with oil heating equipment, combustion and fuel economy.

It has long been well known that velocity plays a very important part in all heat transfer systems. Any betterment in specific transfer rates in such systems must always involve velocity. Realizing this fact, we decided to adopt as a basic principle, the employment of energy to impart velocity required for high transfer rates through a heating diaphragm.

Our method of modernizing obsolete shell stills is founded on this principle. Mechanical energy is usually cheap and its rational expenditure is returned in the form of greatly increased heat transfer rates, on both oil and gas sides of the sheet. Certainly there is nothing new in this principle, the only novelty being that of our peculiar method of application.

On the oil side, use is made of a centrifugal pump to jet the oil against the heated sheet, thereby creating a high velocity sheet flow over the entire fired area. Such a pump is one of the most efficient machines, so far developed for moving fluids. The oil, under pressure, impinging on the transfer surface at high velocity, furnishes a continuous sheet of liquid in intimate contact with it, for the efficient absorption of heat as rapidly as it can be transferred.

The continuous sweep of this liquid sheet over the transfer surface keeps it scrubbed clean and reduces the temperature of the oil film in actual contact with the metal, maintaining a minimum temperature difference between metal and oil.

On the gas side, a forced draft fan feeding air to the furnace, furnishes energy, first for intimately mixing the oil and air, and second for continuously spinning the combustion gases under the full length of the still. The function of spinning the combustion gases is to move the gas-film in contact with the still, and thus promote increased convection transfer over the entire bottom.

Our experience has shown that the heating capacity or transfer rate per square foot in shell stills with oil circulation is equalled by very few oil refining heaters of other types and probably exceeded by none.

The fired bottoms of such shell stills, exposed to radiant heat at the highest temperature levels in the combustion zone are immune from coking or other heating surface troubles. This is true also with direct flame impingement against the bottom.

The application of oil circulation to shell stills makes possible the most efficient combustion with highest flame burst temperature and lowest excess air. The thermal efficiency of such heaters may be raised to any practical value, justified by the price of fuel and the allotted pay-out time.

THE cost of applying oil circulation to otherwise obsolete bottom fired shell stills is materially less than the cost of equivalent heating capacity in any other present type of heater.

It may be of interest to state here the reason why we undertook the modernization of shell stills rather than install pipe stills which were available and much more efficient than our old stills. The cost, then, of pipe stills was high and the abandonment of the large number of shell stills already installed was considered inadvisable from the standpoint of capital investment.

In the beginning, close contact with operating personnel developed much friendly opposition. This had a distinctly stimulating as well as a sobering effect. Many operators asked how we could hope to better shell stilling of petroleum when these heaters had been developed by the industry and used for a period of over 50 years without material change.

Most of the first period was passed in experimenting with combustion methods and desirable fire box construction and learning what had to be done to an ordinary centrifugal

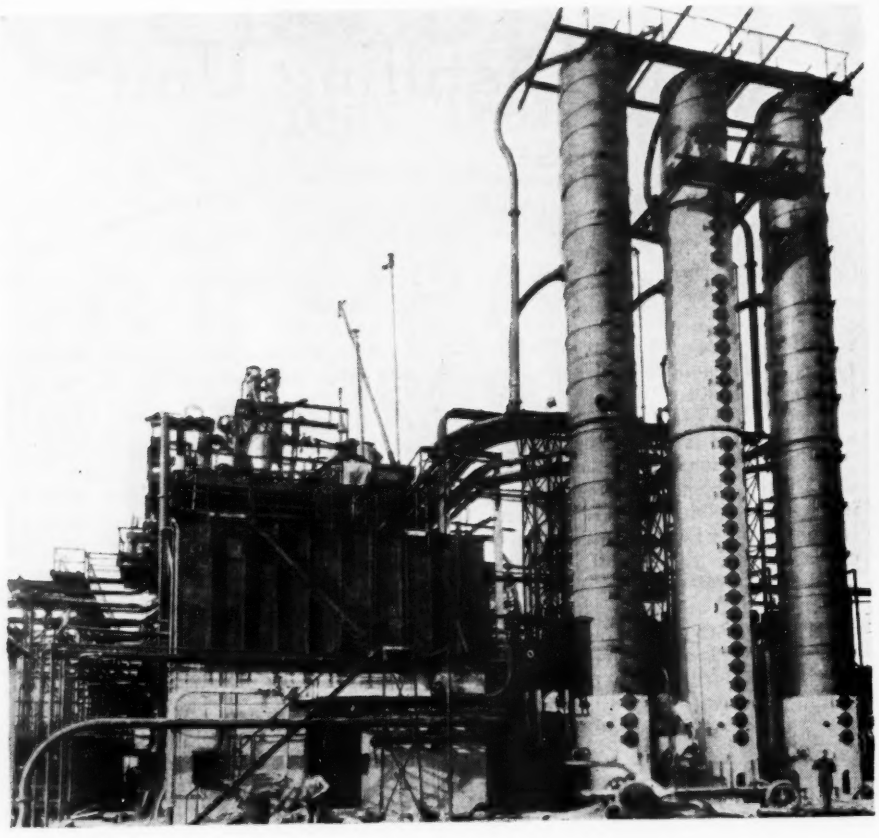
Making the Shell Still Really Work

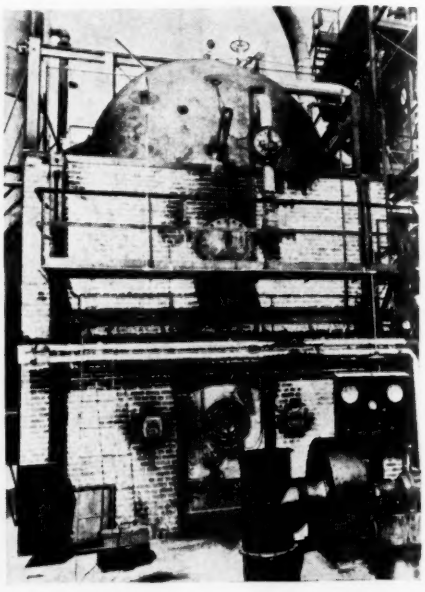
IN NO paper presented at the refinery engineering sessions of the Petroleum Division of the A.I.M.E. meeting was more interest manifested than in the accompanying paper.

It will be remembered that Mr. Stratford wrote an article for NATIONAL PETROLEUM NEWS (page 49, Oct. 5, 1927 issue) on the work he had done at the refinery of the Associated Oil Co. at Avon, Cal., converting ordinary shell stills from simple and comparatively low efficiency pieces of equipment into individual high velocity distilling units capable of vaporizing 40 to 50 per cent of 8000 to 10,000 barrels of crude a day.

In the accompanying paper he makes a further proposal for increasing the efficiency of the shell still at even less cost than is necessary to convert one to the type mentioned earlier. Mr. Stratford's latest idea is to do away with a masonry firebox and setting altogether, fit his still with an internal firing flue and jet the oil against the outside walls of this firing flue. Because of its length, Mr. Stratford's paper will be published in two parts. Next week, his latest step, that of using a still with a single internal flue, will be discussed.

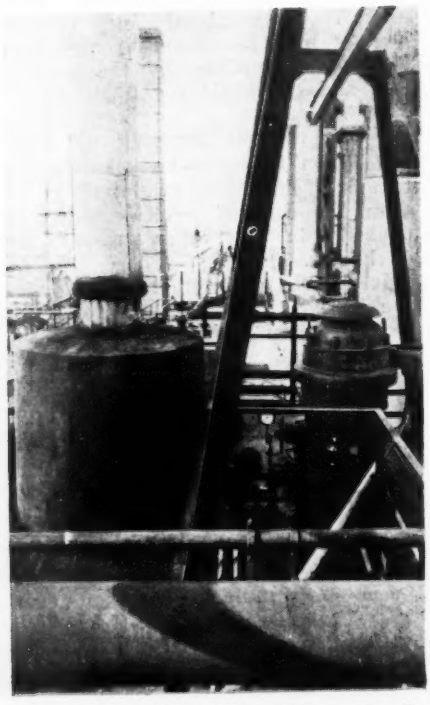
General View and Some of the Details of Stratford Still





Firing front of latest 12′ x 45′ oil circulation still showing blower, burner and windbox

Fractionating towers for six 12′ x 45′ oil circulation stills. Each tower connected to two stills. Products—three gasolines, kerosene, gas oil and residuum



Vapor dome and 100 H. P. driving motor for 3600 F. P. M. oil circulation still pump

Latest type 100 H. P., 3600 G. P. M. double suction oil circulation still pump

pump to convert it into a pump which would unfailingly and efficiently handle boiling oil.

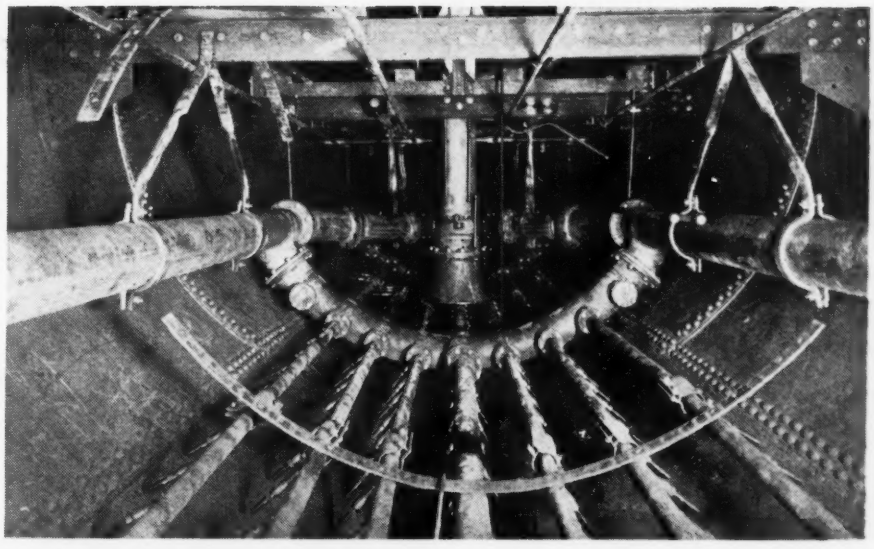
THE first four stills equipped were 10 feet in diameter and 40 feet long. Against the bottom of each, 750 gallons of oil per minute was pumped. A charging capacity of 5300 barrels was attained, vaporizing about 42 per cent. This was a throughput of more than five times the former capacity of the still without agitating steam.

Each of these stills, so equipped, was operated as a single continuous distilling unit charging crude in and taking vapor and residuum out. Side walls of the furnace under these stills were air-cooled, delivering air to the wind box at approximately 300 degrees Fahr.

Following the first installation, six stills 12 by 45 feet were equipped with oil circulating pumps, discharging 1100 gallons per minute against the bottom. No radiant or convection coils were applied. These stills were operated as individual units. They were run at a capacity of 6500 barrels per day each, 40 to 50 per cent being vaporized.

A trial of potential capacity of a few hours' duration was made during which time a throughput of 9400 barrels per day was reached with a single still. The application of good fractionation to this battery has resulted in a material increase in recovery of gasoline and in improved over-all realizations of distillates.

The last 12 by 45-foot still was equipped with a circulating pump having a capacity of 3600 gallons per minute at 35 pounds pressure. A rate of 9200 barrels per day was reached with this still but the rate was decreased to 8500 barrels per day in order not to overrun the capacity of fractionating equipment.



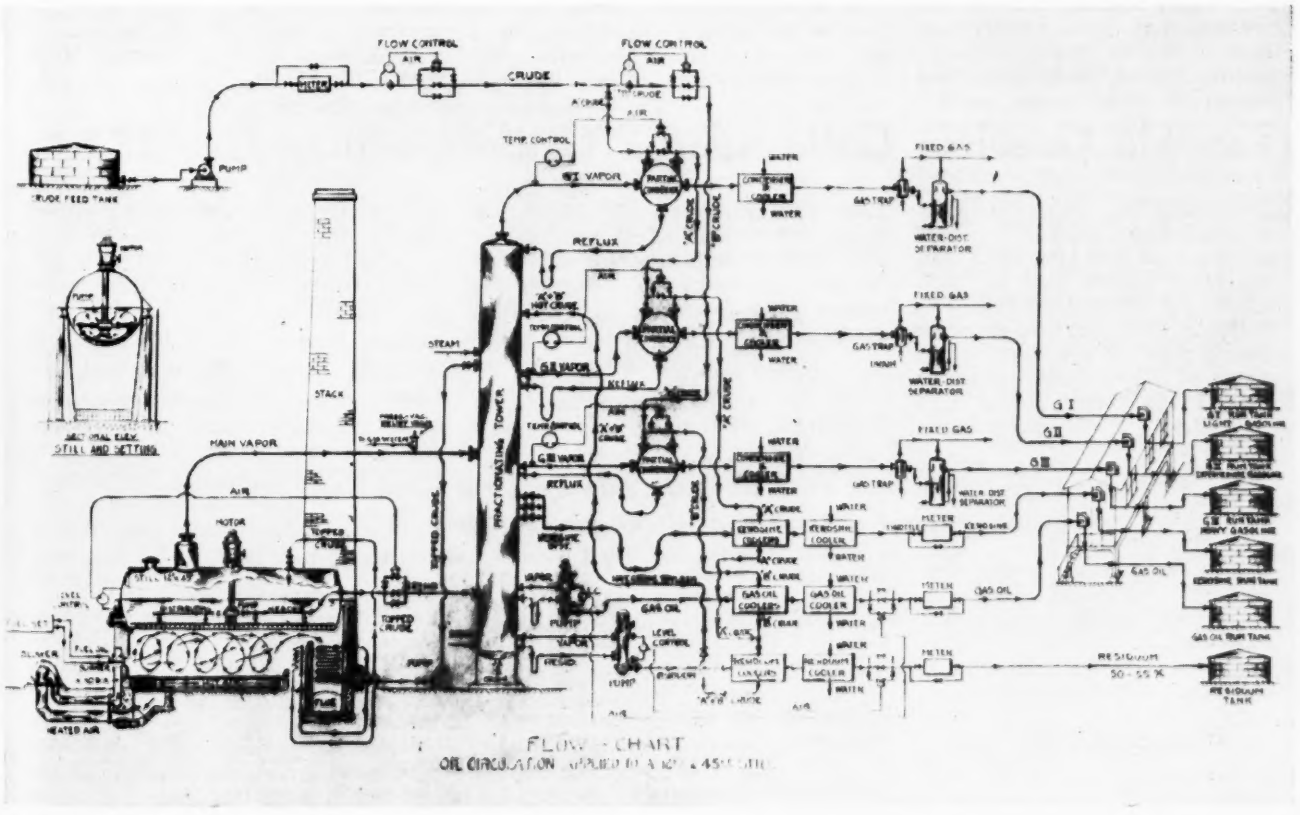
Interior oil circulation manifolding and still pump in latest 12' x 45' still equipped

A small tubular convection bank was applied to this still. Average gas temperature entering the convection bank is 1200 degrees and temperature of gases out to stack, between 585 and 700 degrees Fahr. The variation in the temperature of the outlet flue gases is determined by the temperature level of the oil pumped through the convection bank.

Radiant tubes were applied along the front face of the bridge wall to prevent anticipated overheating of the bridge wall and to absorb heat from the end of the flame burst.

The radiant coil is simply an addition to the radiant absorbing surface of the still bottom. Operation has shown the tubular radiant surface to be unnecessary, though possibly useful, as a separate heater with certain flow hook-ups of the distilling unit.

IN EQUIPPING all of the 11 stills above with oil circulation we naturally encountered many unforeseen difficulties. While our anticipation of probable capacity of heaters seemed too high to many during the design stage, in every case, we great-



FLOW CHART
OIL CIRCULATION

ly underestimated capacity actually attained.

Owing to the present inadequacy of old flues and stacks, to handle the greatly increased volume of flue gases and the limitations imposed by some vapor handling and exchange equipment it has been impossible, so far, to determine the top capacity of any of these heaters.

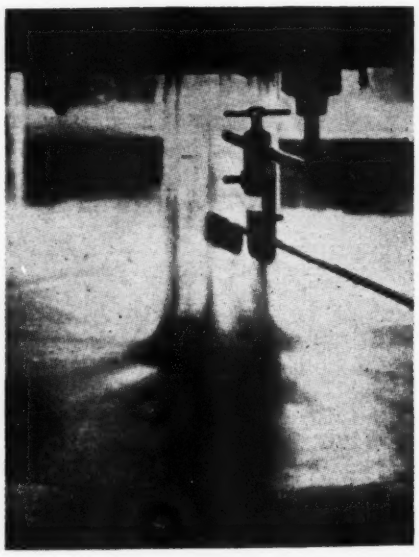
However, with flue gas economizers installed, it is the writer's conservative opinion that the probable charging capacity of an outside fired, 12 by 45-foot still, running refining crude, and vaporizing approximately 50 per cent, lies somewhere between 10,000 and 12,000 barrels per day.

The first result of operating oil circulation stills attached to fractionating equipment and running on refining crude was the shut down of a number of shell still batteries and pipe still toppers. Direct fractionation of distillates eliminated need of re-run stills. The expanded distilling area thus suffered a very profound contraction for the same normal throughput. It was also necessary to correspondingly contract operating personnel.

Many boilers formerly fired for generating steam for distillation were taken off the line since the use of agitating steam in the stills was eliminated. Present use of steam is restricted to bringing heaters up to running rate and to stripping sections of the fractionators.

The overall fuel consumption has been reduced to less than one-half of old requirements, now varying on the average between 0.9 per cent and 1.3 per cent by volume. In the last two years, the total cost of distilling refining crude has been reduced by over half.

Regarding service factor, it is interesting to note, that the last oil circulation still, in continuous operation, has required no cleaning since it was first fired in June 1927.



Liquid jets impinging against flat plates. Stream line flow is changed in direction 90° with approximately 3% loss in energy. There is no appreciable erosion at point of impingment owing to the absence of secondary vorteces (Reference Dr. F. Reich 1926).

In general, shell stills have an advantage in that a large surface of oil is exposed in them to free evaporation. Though many refineries may object to fire hazards involved in shell still operation, with oil circulation against the bottom, this hazard is reduced to a negligible minimum. Our California crude petroleum is not the easiest type of oil to distill. It is wet, when charged to the stills, which causes a perceptible increase in fuel rate. California crude is considered dry when it contains only 1 per cent of water. The water content usually varies between 2 and 3 per cent. This water in the crude contains much salt which rapidly fouls the tubes of heat exchangers.

Salt crystals in the residuum within the still tend to fuse to the fired sheet at high firing rates and thereby to create hot spots. That was the compelling reason for increasing the quantity of oil jetted against the bottom in the last still constructed. This about concludes the story of outside fired and inside circulated shell still heaters.

Fuel Oil Use Grew 13% In Minnesota in 1927

MINNEAPOLIS, Minn., Feb. 25.—An explanation of the oil inspection tax in Minnesota, why it was adopted, how it works and its results, is given in the report of Hjalmar Nilsson, chief oil inspector of the state.

In this report Mr. Nilsson states that 289,686,418 gallons of gasoline were imported into Minnesota during 1927, a gain of 8 per cent over 1926; 21,687,549 gallons of fuel oil, or 13 per cent more than in 1926, this gain probably due to the increasing number of fuel oil burners for home use; and kerosene, 0.5 per cent more than in 1926.

All the money collected in taxes on gasoline used in automobiles is transferred into the public highway fund. Of the total amount of gasoline used in 1927, 14,173,548 gallons, or 5.2 per cent, were used for other purposes, and therefore, were tax exempt. Total gasoline tax collected in 1927 was $5,510,257.40, but with refunds made on gasoline used for agricultural purposes, the net amount turned over to the highway fund was $5,174,879.71.

Taxable Gasoline Gallonage in California Increases 12%

LOS ANGELES, Feb. 25.—California marketing companies paid gasoline taxes on 1,017,691,662.8 gallons of motor vehicle fuel in 1927, an increase of 111,803,509.5 gallons over total in 1926, or an increase of approximately 12 per cent.

A total of 55 different concerns paid taxes in California during 1927 against a total of 86 concerns in 1926, a decrease of 31 distributors. During third and fourth quarters of 1927, forty-three companies paid taxes on gasoline distributed. During the second quarter of the year, 48 distributors reported and 50 reported for the first quarter.

The eight leading companies of California, during 1927, paid taxes on total of 915,376,922.3 gallons against 807,306,526.4 gallons in 1926, or a net increase of 8,070,395.9 gallons. Other companies paid taxes on 102,314,740.5 gallons in 1927 against total of 98,581,626.9 gallons in 1926, showing an increased gallonage by the independent companies of 3,733,113.6 gallons.

California Motor Vehicle Fuel Distributions by Eight Leading Companies

Based on Retail Sales — Tax Reports in Gallons

Company	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	Total 1927	Total 1926
Standard Oil	52,870,892.3	69,840,577	70,513,256.9	62,602,624	255,827,350.2	235,221,791.7
Shell Co.	34,261,512	50,948,235	50,570,587	46,059,497.6	181,839,831.6	142,991,546
Union Oil	26,369,781.3	36,882,280.3	37,565,409	34,824,751	135,642,221.6	101,613,556.5
Richfield	31,609,026	34,963,678	33,683,447	29,172,542	129,428,693	128,451,619
Associated Oil	22,164,684.5	24,136,083.6	22,213,978	20,588,408	89,103,154.1	94,709,167.5
California Pet	12,876,180	14,107,481	14,615,194	13,887,129	55,485,984	37,462,896
Pan American	10,927,121	9,014,352.9	7,410,752.9	8,052,566	35,404,792.8	31,514,046.2
General Petroleum	7,724,687.5	8,308,242	8,704,648.5	7,907,315	32,644,893	35,341,903.5
Totals 8 Companies	198,803,884.6	248,200,929.8	245,277,273.3	223,094,832.6	915,376,920.3	807,306,526.4
Other Companies	20,012,608.4	22,132,149.4	28,486,396.3	21,683,588.4	102,314,742.5	98,581,626.9
Total all Companies 1927	218,816,493	270,333,079.2	273,763,669.6	254,778,421	1,017,691,662.8	905,888,153.3
Total All Companies 1926	199,495,068.3	228,400,141.6	244,914,522.5	233,078,420.9	905,888,153.3	

Greater Known Reserves of Crude Exist Than Ever Before in History

Staff Special
NEW YORK, Feb. 23

A YEAR ago students of petroleum economics at session here of the Petroleum Division of the American Institute of Mining and Metallurgical Engineers were largely concerned with what production might be expected from the Seminole district of Oklahoma during the coming year.

Many of these same individuals at the current meetings of the petroleum division, Feb. 22 and 23, were endeavoring to forecast the influence of the newer west Texas developments on the industry for 1928.

Considerable time was given to this subject at the session on Petroleum Economics the afternoon of the 22nd. C. P. Watson, president of the Federal Royalties Co., Fort Worth, read a paper on the "Economic Significance of Oil Developments of West Texas," in which he set forth estimates of future production from exploited territory, by fields.

Yates	325,000,000 bbls.
Church-McElroy	180,000,000 bbls.
Big Lake	65,000,000 bbls.
Hendricks	120,000,000 bbls.
Misc.	25,000,000 bbls.
Total	715,000,000 bbls.

Another of Mr. Watson's conclusions was that outlet of this crude to primary markets through pipe lines and tank cars for the first half of 1928 would not exceed 310,000 barrels daily, of which pipe lines would move at the rate of 140,000 barrels daily, railroads, by tank car, 140,000 barrels daily, and local refineries use from 20,000 to 30,000 barrels. He believed the maximum movement by the end of this year might reach 400,000 barrels daily, the increase being due to the pipe line facilities provided by the new Shell line to the Gulf and to space, provided by tank farm storage.

Most significant development in field work at present, he said, were extensions to the Hendricks field and evidences of a new field north of the Church-McElroy producing territory.

Cost of transporting west Texas oil to Gulf ports he placed at 48 to 55 cents through pipe lines, and 60 to 68 cents by tank cars.

Questions Yates Estimate

Julius Fohs, geologist, was called on to discuss Mr. Watson's paper by Joseph E. Pogue, petroleum economist, New York, who presided at this session. Mr. Fohs placed the estimate of 325,000,000 barrels, estimated future production from the Yates pool as too high by at least 100,000,000 barrels and said he believed that considerable territory in this west Texas area which had at one time been considered as probably productive could now be considered as negative. He said that water drives, now a great factor in certain of this territory, would be an equally great factor in its rapid decline.

Among other speakers, R. S. Knappen, Gulf Oil Co., disagreed with Mr. Fohs on some points he raised. He said that large areas in Crane, Ward, part of Pecos and other counties had not yet been tested, and might develop new pools comparable to those already producing. He said that the first test drilled in the Hendricks pool came within one location of missing the field entirely and intimated that a great deal of exploratory drilling would have to be done before it could be said parts of this great territory were not oil bearing. The possibility of future production from deeper sands, in even present known fields, was also brought out.

Refining possibilities of west Texas crude was commented on briefly by Dr. E. R. Lederer, Texas Pacific Coal & Oil Co., Fort Worth, who has had considerable experience with this oil. He said the crude presented difficulties, because of its corrosive sulfur compounds, which could be solved by the refiner; but he said, because of the fact these sulfur compounds are of different chemical composition in each product produced, a great amount of research work was necessary, which he believed came mostly within the province of the larger refining companies.

"Gasoline can be produced equal to gasoline from other crudes at an additional expense of handling over other crudes of from 20 to 30 cents a barrel," said Dr. Lederer.

Economic significance of developments with regard to other petroleum products was discussed by other speakers as follows in summary:

Trend of Natural Gasoline Market

A PAPER prepared by D. E. Buchanan, of Chestnut & Smith Corp., and read in his absence by Charles Osmond, of Crandall & Osmond, refinery engineers, brought out that there was some prospect for a decrease in 1928 in the percentage of light to heavy crude produced in the country, which might provide a relatively greater market for natural gasoline to bring up the volatility of motor fuel turned out at refining plants; but that the principal relief as regards stabilization of the natural gasoline business could only come through the research program to find new uses for this product. The natural gasoline business must become a chemical industry, rather than a by-product industry.

Mr. Buchanan's paper brought out that, in 1923, 82 per cent of all the crude produced was light oil, that this relationship dropped in later years; but, in 1927, increased to 87 per cent. He said that natural gasoline output, in 1927, including California, was 40,000,000 barrels, a 20 per cent gain over 1926. The Mid-Continent industry produced 60 per cent of this total output.

The problem before the natural gasoline business, said Mr. Buchanan, was to eliminate its more volatile products from that portion that went into motor fuel and to find a market for these lighter fractions through research.

Chairman Pogue said that the natural gasoline business had pointed the way for the rest of the industry in that it had turned the force of technology on finding markets, rather than on increasing the supply of its product.

Fuel Oil Customers Driven Away

PRINCIPAL point brought by Arthur Knapp, engineer with the United Gas Improvement Co., Philadelphia was that the oil companies have driven away a good share of their fuel oil customers by leading them to believe that, once they were eliminated by price, they were eliminated for all time. "The petroleum industry believed and made the customer believe there would never be any appreciable recession in price which would make it worth while for any consumer of fuel oil to resist elimination with the expectation of future lower prices," he said.

"The recovery of former fuel-oil customers would furnish an outlet for a large volume now without a market.

"Real sales effort will be necessary in order to sell fuel oil in competition

with other fuels. More attention will have to be paid to external competition and less attention to intensive competition within the industry.

"Better balance could be obtained under present conditions by proper regulation of output and by proper merchandising. By 'proper merchandising' is meant a proper relation between price and output, in order to bring a close balance of the volume of sales of various products. 'Proper merchandising' also means a proper attitude toward the relation of the price of crude stored to cover contracts and the price of the refined products sold under these contracts."

(Mr. Knapp's paper was published in full in Feb. 22nd issue of NATIONAL PETROLEUM NEWS).

The Changing Gasoline Market

THE change in the tank car and tank wagon and even retail markets for gasoline was discussed by Barnabas Bryan, consulting economist, New York, in his paper "Economic Aspects of the Gasoline Situation." He used charts based on NATIONAL PETROLEUM NEWS prices to illustrate his remarks. He said:

"The tank car price of gasoline today is controlled by oil in the ground, rather than by stocks of gasoline or methods of refining. Previous to the commercial cracking of fuel oil, there was a normal and continuous relation between gasoline stocks, consumption and prices. From the beginning of the new cracking era in 1923 to the summer of 1926 there was a changing relationship, growing toward a correlation between the potential gasoline in storage and the price of gasoline. Since the development of large reserves of shut-in production in Wyoming, California, Seminole, West Texas and Venezuela, the relationship between stocks of gasoline and gasoline prices has disappeared. The extreme depression of the Group 3 price can only be accounted for by oil which is not being produced but which we fear may be produced at any time."

* * *

"Stocks of potential gasoline have decreased from 17 months' supply at the peak of 1924 to a low of 7 months' supply during the past summer, yet the low immediately precedes the lowest price for gasoline since it was a waste product. The tendency of the price curve to parallel the curve of potential supply is quite pronounced until the summer of 1926, since which time they have abruptly separated. The curve of gasoline stocks is equally remarkable in relation to price when it is considered that total consumption for the year 1927 is almost exactly twice that of 1924. Clearly a new factor has been introduced. There is no possible factor to account for this distortion except known reserves of oil in ground storage, and, therefore, until such time as the Bureau of Mines or the American Petroleum Institute collect and publish regular figures for shut-in production, the economist will continue at a disadvantage in justifying or forecasting the gasoline situation."

* * *

"There seems but little probability at present that East Coast gasoline will rise in relation to Group 3 gasoline, while it may easily decline further. So long as overproduction continues in California, West Texas and Venezuela it will require artificial manipulation of prices to raise the differential to its former level. California excess will continue available, subject to tanker rates. West Texas crude will continue to move largely to the coastal refineries of Texas and by tanker to the East Coast. Venezuelan crude can be delivered to East Coast cracking plants at less than $1 per barrel; and the known fields of the Maracaibo basin are of greater potential importance than was Mexico in its prime. So long as this differential remains at its present level, the Mid-Continent refining industry is overbuilt, subject only to growth in Middle West demand and improvements in methods of marketing."

Petroleum Export Trade

THE following points relating to closer co-ordination of foreign competition and development of foreign oil business in 1928 were presented in a paper prepared by John H. Nelson, of the Petroleum Section of the Minerals Division, Bureau of Foreign and Domestic Commerce, Washington; on the subject "Economic Outlook for Exports of Petroleum Products":

"The two most important foreign competitors of American oil-exporting organizations are the Royal Dutch Shell Group and the Anglo-Persian Oil Co., Ltd. The expansion and closer coordination of the two promises a greater economy and efficiency of operations, which indicates a proportionately increased intensity of competition to American companies. The Royal Dutch interests have recently purchased the refinery property of John Fells, Ltd., in Australia and the Columbia Oil Co. in New Jersey. The Anglo-Persian Oil Co., Ltd., has entered the Swedish market on a national scale. The Burmah Oil Co., Ltd., of Burmah, and the Asiatic Petroleum Co., Ltd., of India (Royal Dutch Shell) have recently merged their interests for India. The intimate association of the Anglo-Persian Oil Co. and Royal Dutch Shell interests in the Turkish Petroleum Co. have been previously noted.

Summary and Conclusions

"The year 1928 promises to develop marked changes in the volume and direction of United States export trade in petroleum products. In 1927 we have noted an increased volume of products exported simultaneously with sharp depreciations in values. In a large measure these greatly lowered values are a direct result of a world-wide excessive production of oil, but perhaps of slightly less importance are the increasing sales of Russian oil

A Solution of the Conservation Issue

(Suggested by Barnabas Bryan, consulting economist, New York, at the close of his address before the Petroleum Division, A. I. M. E., New York, Feb. 22, on "Economic Aspects of the Gasoline Situation".)

"THE cure for the difficulties of the oil industry lies not in legislation, which its advocates should know cannot be obtained in time to save considerable insolvency, but in a direct appeal to the Supreme Court for a final application of present law to present conditions. In spite of any amount of restraint which may exist in pipe line transportation, or refining or marketing, the decision must necessarily be that, *in the production branch taken alone, it is impossible for overproduction and restraint of trade to exist at the same time.*

"In a similar way, and in spite of the Committee of Nine, gas and gasoline conservation can be secured by carrying to the Supreme Court a case involving the rights of a neighbor and thus practically force the unit operation of oil pools. When gas is wasted, any neighbor's right of capture is damaged without due process of law, in that the percentage of oil within the reservoir which can be recovered is greatly decreased. The Supreme Court has never passed on a case of this kind where the full facts of oil production were involved. The American Petroleum Institute has provided ample expert testimony for the case in the Report of the Technical Sub-Committee of the Committee on Gas Conservation. The petroleum industry would lose nothing and gain a great deal through the decision which could certainly be obtained."

abroad at prices and terms incompatible with the prevailing economic practices of practically all other countries.

"This condition is further aggravated by excessive competition for export business among the large number of smaller refiners in the United States in times of overproduction, which under present conditions in the export market, amounts to an establishment of market at constantly lowered prices, while the actual business goes to a competitor operating under a unique form of national economy. The resulting prices in turn tend to depress domestic quotations.

"The tendency to sales monopolies for oil and the legislative control of the industry abroad has been noted. The effects on American exports are immediate and direct. To a large extent these monopolies are formed for reasons more political than economic. Supplies are usually drawn from sources more intimately related to the monopoly countries by politico-financial alliances without regard to the natural laws of supply and demand on the international market. Examples of this are seen in Turkey, Spain, Greece and possibly Italy, all of which under normal conditions have taken a large proportion of their petroleum requirements from the United States but for which at present the product of Russia and Rumania is substituted.

"Excessive civil and military disturbances, as well as restrictive taxation in China, coupled with the present difficulties of rival marketing organizations in India, make any forecast for the world's two largest kerosene markets exceedingly difficult. In the former a consumption progressively increasing for years is greatly retarded, and in the latter kerosene from hitherto American and Dutch East Indian sources is replaced to a large extent by Russian kerosene.

"The greatly increased refining capacity of certain foreign countries, actual or under immediate consideration, notably in England, France, Germany, Venezuela and Spain, promises to give a greater international movement of crude oil at the expense of United States exports of refined products.

"American oil companies engaged in export trade have a foreign investment of American capital of approximately $1,500,000,000 devoted to this trade. It is perhaps needless to point out that the extended development abroad of nationalization, sales monopolies and refining capacity will seriously restrict, if not jeopardize, the continued profitable employment of a large portion of capital.

"The influence of Russian oil in the major export markets of the United States, chiefly Europe and the Far East, has contributed in no small measure to the present low levels of export prices. The critical condition of mechanical equipment of the Russian oil fields, further aggravated by inadequate transport and distributional facilities, and the limited availability of foreign credits to improve these conditions, make it exceedingly improbable that any great increases in export volume of Russian oils may be expected in the current year. However, any marked change in the present Soviet oil policy or the availability of any large amount of credits would tend to reverse this situation within a short period of time.

"The sharp declines in prices of almost the entire range of petroleum products have minimized the incentive abroad to develop substitute products. While isolated instances of the limited use of alcohol fuels is noted, in few cases are these entirely satisfactory in present-day types of internal combustion engines. Germany is the only country in which the actual commercial production of petroleum substitutes is now occurring. During 1928, it is expected that this production, by applying the well known Bergius process to coal, will total somewhere between 100,000 and 150,000 metric tons of all products, a quantity equal to only a portion of the annual increased consumption in Germany recorded during the past few years.

"The greatly increased production of oil in South America, and the probable new large production expected in Irak through the activities of the Turkish Petroleum Co., will undoubtedly cause marked changes in the trend of our export trade. A possible counterbalance to this may be found in the increasing consumption of oil products abroad which may, of course, proceed at such a rate as to absorb the output of these new producing regions without abruptly displacing American exports."

1927 May Prove Turning Point Toward Rationalization of Production

(Introduction and general summary to address of Joseph E. Pogue, consulting engineer, New York, before Petroleum Division, A. I. M. E., on "The Trend of the Petroleum Situation").

"THE past year in the petroleum industry was one of overproduction, rising inventories, low prices, and meagre to vanishing profits. This outcome was the result of a long period of intensive and uncompensated effort on the part of both financial and industrial interests to stimulate *supply* on the theory that the primary problem facing the petroleum industry was the development of an adequate reserve of raw material to protect a large and ever-growing investment.

"The stimulus was applied in various forms and through diverse channels: capital had long flowed into the industry in excessive amounts under the attraction of large expected profits; the price level for crude petroleum had persistently been influenced by speculative considerations, with the result that prices declined slowly in periods of flush production and were quick to advance in anticipation of statistical improvement, thus maintaining a superfluous degree of stimulus on wildcatting and on drilling; speculation in inventories had led to the unsound, or at least unusual, business practice of accumulating huge stocks of oil; and, above all, the industry had directed the potent force of technology to the expansion of supply and achieved radical results in accelerating oil discovery, speeding up the rate of oil extraction, and enlarging the recovery of gasoline and lubricating oils from the raw material.

"In short, the economic conditions of 1927 were exactly those to which the objectively driven enterprise of the petroleum industry had long been directed; and the undesirable financial consequences arising therefrom reflected no lack of success in what had been set out to be achieved, but rather the failure to have established concurrently the necessary means of economic control to prevent the immediate conversion of reserves into current supply, likewise the oversight in neglecting to apply the technological force to the enlargement and diversification of the market for petroleum products. Perhaps, when viewed in its longer perspective, 1927 will stand out as the turning point in the economic policy of the petroleum industry, whereby the technique of rationalizing production made its initial claim for recognition."

NEW YORK—J. K. Garrigues, secretary-treasurer of Acewood Petroleum Corp., New York City, and who has been with the company since its organization in 1924, has resigned to join the Delaware Trust Co., Wilmington, Del. Mr. Garrigues was with the old Union Petroleum Co. before Union was purchased by the Sinclair Refining Co.

HETTINGER, N. D.—Carl J. Austad has bought the bulk and service station here from the Dakota Oil Co. of Lemmon, S. D.

Wildcat Links Two Venezuelan Fields Into Probable Pool 30 Miles Long

By Ed Hopkins and H. J. Wasson*

Presented before Petroleum Division, A. I. M. E., New York, Feb. 23

AT THE close of the year Venezuela was producing at the rate of 205,000 barrels per day, making it the third country in the world in point of present daily production. For the year, the total was close to 64,000,000 barrels, representing an increase of about 70 per cent over the 37,000,000 barrels in round numbers produced in 1926. All of the 1927 production came from fields opened up previously to the beginning of the year.

While no new fields were added to the list of shippers, the past 12 months' wildcatting yielded a fair quota of new discoveries which, in the light of present results, may be considered likely sources of production in due time. Altogether three such promising finds were made.

Of first importance, at least for the immediate future, is the completion by the Lago Petroleum Corp. of the San Matias well, 4 miles north of the present edge of the Lagunillas field. Though rated as only a 125 barrel well, at 3217 feet, it indicates a probable extension of the field over the intervening 4 miles between the two.

The two other wildcat discoveries of importance were the Los Manueles well in the District of Colon, which has in all probability opened up a new field about 7 miles north of the present Tarra operations; and the Hombre Pintado well of the Standard of Venezuela, in the State of Falcon, which is considered to be a promising development. Neither of these last mentioned two discoveries will appreciably effect production during 1928, as the Manueles area must await the carrying out of a general plan for the exploitation of the District of Colon, a problem requiring time. The Hombre Pintado area is being tested further, but doubtless several wells will be put down before anything definite will be done towards making the pipe line arrangements that must necessarily precede the commercial exploitation of the field.

The San Matias well is a highly significant development. It is located along the trend of the La Rosa-Lagunillas producing formations, and, when drilling started, production in the Lagunillas field was 4 miles away, and in La Rosa to the north 10 miles away. The well thus is about 3 miles from the centre of the 14-mile stretch lying between the most northerly Lagunillas field well, and the most southerly well at La Rosa. The finding of oil in this well makes it seem reasonably probable that the Lagunillas field extends for at least 4 miles north, and to a lesser degree probable that the La Rosa productive area extends a further 10 miles south.

It appears that this well has greatly strengthened the probability that these two fields will eventually join together. To many it will seem hardly credible that any single wildcat well could prove such an extensive stretch of territory; however, when it is recalled that both La Rosa and Lagunillas lie along the same major monocline, and that, so far as is now indicated, there are no closing contour lines separating the two fields, it must appear that the intervening monoclinal territory stands an excellent chance of being productive even before drilling has established this as a probability.

The partial confirmation of this probability, though not unexpected, stands out as one of the momentous accomplishments of the year in the Maracaibo basin. It forecasts the future development of an oil field some 30 or more miles long, in which substantial areas of 50,000 barrels, and even 100,000 barrels an acre production may be confidently expected.

It is much too early to hazard a guess as to the quantity of oil this La Rosa-Lagunillas area will produce, but as a tentative estimate, there seems to be a good likelihood that 40,000 acres of productive territory are in sight, and that an average of 25,000 barrels an acre will be exceeded. These figures combine to make a total of a billion barrels. This quantity, though possibly much too low, or slightly too high, is close enough to indicate the order of magnitude of the situation, and this should compel full recognition of the La Rosa-Lagunillas field, whenever the statistical curves of the oil industry are being projected into the future.

THE activities during the past year along the east shore of Lake Maracaibo, which include the Ambrosio, La Rosa, Punta Benitez and Lagunillas fields, and the above mentioned intervening territory, were notable in many respects. The Lagunillas field, at the southern extremity of this sector, though but little over a year old, jumped into

*Consulting Geologists.

90,000,000 Barrels From Venezuela in 1928

"THE question of how much oil Venezuela will produce during the coming year is a matter of considerable importance. Heretofore the successive annual increases, though large from a percentage standpoint, did not involve enough oil quantitatively to exert any appreciable effect on the general market situation. However, under present market conditions the expected increase from Venezuela will constitute a substantial percentage of the surplus oil that will undoubtedly be produced and run to storage during the year.

"For example, the Venezuela output in 1928 will probably reach a total of 90,000,000 barrels, or an increase of 25,000,000 barrels over the 1927 output. If, during 1928, crude storage stocks in the United States are increased by 50,000,000 barrels, as seems not unlikely, then the expansion in Venezuela during the year will have indirectly contributed 50 per cent of the unconsumed surplus.

"At present writing it seems certain that Venezuela during 1928 will record a production of at least 85,000,000 barrels (33 per cent over 1927), though with any sharp dip in the United States production curve having a tendency to stimulate heavy crude prices, there is little doubt but that it would pass the 100,000,000 barrel mark for the year. Considering the various market factors which may tend to restrain any undue expansion, the author's best estimate, admittedly a guess at this time, is 90,000,000 barrels for the year 1928."

VENEZUELAN OIL STATISTICS FOR 1927

(By Ed. Hopkins and H. J. Wasson)

DRILLING SUMMARY							PRODUCTION SUMMARY						
	Wells Drilled prior to 1927		Wells drilled during 1927		Total wells to Jan. 1 1928		Average depth of hole drilled during 1927	Wells drilling at end of 1927	Prior to 1927 Bbls.	During 1927 Bbls.	Cumulative production to end of 1927 Bbls.	Age of Field Years	Gravity of oil Degrees Baume'
	Producers	Dry Holes	Producers	Dry Holes	Producers	Dry Holes							
Mene Grande	95	3	42	0	137	3	2625	9	28,304,882	9,874,531	38,179,413	11	18
La Rosa	226	8	92	2	318	10	2684	8	34,166,861	19,283,208	53,450,069	5	25
El Mene	104	37	27	17	131	54	1100	4	5,937,109	2,535,023	8,472,132	4	36
La Paz	21	3	5	0	26	3	1500	0	1,079,057	227,371	1,306,428	3	25
Concepcion	45	1	19	0	64	1	1500	0	1,113,839	523,928	1,637,767	3	36
Ambrosio	20	2	22	1	42	3	2370	3	1,729,317	272,428	2,001,745	2	24
Punta Benitz	3	0	26	2	29	2	2530	4	133,684	1,146,057	1,279,741	2	26
Lagunillas	7	0	64	0	71	0	3520	13	1,207,913	28,789,918	29,997,831	2	17.5
La Tarra	10	5	5	3	15	8	1470	4	75,000	100,000	(6) 175,000		30
Rio de Oro	3	0	1	0	4	0	3105	0	25,000	25,000	(6) 50,000		27
Guanoco	6	0	0	0	6	0		0	246,606	614,300	(7) 860,906	2	10
Wildcat Operations	(1) 5	(2) 82	(3) 4	(4) 18	(1) 9	(2) 100		16					
TOTALS	545	141	307	43	852	184		61	(5) 74,019,268	(5) 63,391,764	137,411,032		

NOTE:

(1) The discovery wells of the several fields are credited to the fields themselves. The 5 wildcats here listed as producers are the shut-in wells: MONAV 1 and MONEB 1 in Eastern Venezuela; Zampapalo No. 2 in Northern Perija; El Mamon No. 1 in Falcon; and Libertador No. 2 of the North Venezuelan Petroleum Co. in Eastern Falcon.

(2) Contains many holes abandoned because of drilling difficulties; also many that made gas and/or oil, but in non-commercial quantities. Several of these dry holes would, however, have been rated as producers in certain U. S. localities.

(3) The year's successful wildcats are: San Matias No. 1, Hombre Pintado No. 1, and Los Manueles No. 1.

(4) Includes several holes abandoned because of drilling difficulties.

(5) Accurate to within 1%. Error in production figures comes about thru difficulty in accounting for oil consumed in drilling, losses from fires, etc., and in conversion into barrels of the official reports to the Government, which are made in terms of metric tons.

(6) All the production from the Tarra and Oro fields is consumed in drilling or held in storage, except for a few hundred barrels sold to the Encontrados Light Co. There are no pipe line or other facilities available for handling oil from either of these fields in commercial quantity.

(7) This is a very heavy crude requiring a special tanker for its transport. It is used as a flux in the manufacture of prepared asphalt products.

first place among the Venezuelan fields with 29,000,000 barrels for the year, from 71 wells. This field is now nearly six miles long, with good production proved at both extremities, and as yet no dry hole having been encountered.

The La Rosa field was substantially extended both to the north and south by the drilling of over 90 wells. It now seems certain that it will merge with the producing areas known as Ambrosio and Punta Benitez, lying respectively to the north and south off La Rosa proper. Henceforth, it would seem advisable to refer to these three localities as one, under the general designation "La Rosa."

Developments in the Ambrosio end of the La Rosa field were, during the year, unexpectedly good. Some of the older wells were reworked into good producers, and a number of new wells having initial productions of 2500 barrels and over, were completed. The drilling continued throughout the year, and 23 wells were completed; however, very little production was drawn from Ambrosio, as all the wells were shut in after brief initial production tests.

In Punta Benitez, the southern extension of the La Rosa field, 28 new completions were recorded, but these operations were not conspicuously successful. Apparently the sand conditions in the vicinity of Punta Benitez are not as promising as is the case in the La Rosa field proper. Such variations in yield are, of course, to be expected in any large productive area, and perhaps the most surprising thing is the absence to date of any sizeable spots of definitely barren territory.

Elsewhere in the Maracaibo basin developments were carried on at about the same rate as during the preceding year. These activities are summarized in the accompanying table. From the table it will be seen that, aside from the Lake shore pools, there are seven localities listed as producing fields. These are: Mene Grande, El Mene, La Paz, Concepcion, La Tarra, Rio de Oro, and Guanoco.

La Paz and Concepcion were shut down during the greater part of the year, this procedure being possible due to the circumstance that they are one-company fields. The wells in both these fields are of the 50 to 200 barrel type, but the grade of the oil is higher than that of La Rosa crude, and the wells stand up satisfactorily.

THE La Tarra and Rio de Oro fields, in the District of Colon, are located in the extreme south eastern part of the Maracaibo basin. These areas are comparatively remote from the main lines of communication, and their development has been slow—though the presence of oil was established as far back as 1015. Since that time, nearly 30 wells have been drilled by the Royal Dutch in this Colon area, but no transportation facilities have as yet been provided. The delivery of this oil to the lake shore will require some 80 miles of pipe line, which must pass through a difficult, swampy jungle country for the most part; so it is evident that a large reserve of "oil in sight" must be proved before commercial exploitation is warranted.

During the year the Colon Development Co. (the Royal Dutch operating subsidiary) carried out extensive survey work, considered to be the initial steps toward the working out of a transportation plan.

In the El Mene field, production was held steady at about the same rate as during the preceding year, viz.: 2,500,000 barrels. The area of the producing territory was not greatly increased, but a few wells of better than average output were found, and the old wells continued to stand up in excellent manner, so that there were no severe declines to be replaced with new production.

The oil from this field is the highest grade of the Venezuelan crudes. It is a very desirable "sweet oil" and is obtained from the shallow average depth of about 1100 feet. Though lacking in the spectacular glamour surrounding operations in the high pressure Lake fields, El Mene forms an interesting and important part of the Venezuelan picture.

The Mene Grande field continued its substantial output during the year, recording a production of over 9,000,000 barrels, the largest in its 11 years of life. The field limits were not extended much beyond the outlying semi-wildcats completed in 1926; however, the edge wells that were completed were for the most part satisfactory producers, and the field is apparently no nearer to being delimited than was the case at the end of the last year. The most notable completion was No. 105, on the west side of the field, in territory heretofore thought to be of doubtful prospective value. This well is the deepest producer in the field, 4020 feet, and since its completion in October has averaged around 4000 barrels a day. This is the first well drilled to the west of the field in 3 years, and opens up rather unexpected possibilities in this direction. It also quite

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effectively disturbs the tentative production limit line that many observers of the situation had drawn through the present western edge wells. At this writing it looks like the great seepage area outlining the north edge of the field marks the only direction toward which important extensions cannot be expected.

The field started the present year, the twelfth year of its productive life, making 50,000 barrels a day. This is the most it has ever made, but it is thought the actual peak production will not be passed for several years. Being a one company operation, the production rate is controlled more by market requirements than by the potential capacity of the wells.

During the year eight strings of tools were kept in operation, and 42 wells were completed. This scale of operations presents an interesting comparison with the rate of activity commonly witnessed in our prolific American fields. In Seminole, for example, 400 drilling operations built up a production of 500,000 barrels a day, or say 40 operations for each 50,000 barrels, yet, though working in the cream of flush production, the expenditure of drilling effort was five times greater than that expended in the 11-year old field of Mene Grande to attain approximately the same relative tonnage of crude.

This is not offered as an invidious comparison directed in criticism against what has taken place in Seminole, but rather as an interesting statistical contrast that would seem to suggest the compilation of similar yard stick factors for other fields. The number of drilling operations per 1000 barrels of output must be a function of the profit, and the suggestion is here made to the statistically inclined that they undertake a bit of research along this line in the belief that a useful series of factors can be evolved which, when properly weighted with production cost and oil price constants, will from a broad viewpoint be helpful in appraising the relative oil merits of countries, states, and general areas, even though widely separated geographically and geologically.

The Guanoco field is the only shipping locality outside of the Maracaibo basin. This pool is located in eastern Venezuela, not far from the island of Trinidad. The six small producing wells which compose the field are located near a large asphalt seepage similar in size to the more famous one in Trinidad.

At the close of the year these wells were making about 1000 barrels a day of 10 gravity oil, which is used in connection with the manufacture of asphalt products.

* * *

Finally, the picture of the year is not complete without a word concerning the general spirit of co-operation between the operating companies themselves and between the companies

and the government, that has attended and continues to surround the Venezuelan operations with what might be termed a splendid economic environment.

Much of the production comes from the La Rosa-Lagunillas area, where the ownership is divided between three large companies and competitive conditions prevail. The common boundaries cutting through prolific territory are literally miles in extent, but in all this area there are not over 30 rigs in operation, and these are about equally divided between the three companies. The absence of a more diversified ownership, of course, makes it a comparatively simple matter to arrive at agreements covering the restriction of drilling.

Moreover, the absence of any Venezuelan equivalent of our Sherman anti-trust law greatly facilitates the same desirable end. Whatever may be the special conditions, however, that make possible a conservative, may one not even say, sensible rate of operations in Venezuela, the industry and the country should be given credit for being at present one of the outstanding good examples of what should be done in the way of exploiting an exceedingly prolific natural resource for the mutual welfare of the nation and its citizens, and the capital groups in whose hands the operations have been entrusted.

English Seek Concession on All National Lands in Colombia

By L. G. Huntley*

Presented before Petroleum Division, A. I. M. E., New York, Feb. 23

THE entire production in Colombia during 1927 was that from the Tropical Oil Co. concession. Production was approximately 14,000,000 barrels, of which 12,081,000 barrels were exported from the Mamonal terminal of the Andian National Corp. near Cartagena. The balance represents that refined and used or marketed within Colombia.

As production in 1926 was only 6,443,540 barrels, the increase has been more than 100 per cent. This is partly due to the looping of the pipe line from the concession to the coast, and the resultant increase in capacity to 50,000 barrels per day, and also to increased domestic sales. The refinery at Barranca has been doubled in capacity, and it is understood is now handling 5,000 barrels of crude daily. This gives the producing field a potential outlet of 55,000 barrels daily.

The Tropical Oil Co. completed 82 wells in 1927, with one abandoned for drilling difficulties. The average daily initial production was 1136 barrels per well. The largest well is reported to be No. 173 La Cira, rated as 5,000 barrels initial. Most of the wells were drilled on the Infantas and La Cira structures, the latter located en echelon to the northwest of the main Infantas anticline, and separated from it only by a low saddle. Drilling operations on the Llanos fold, also en echelon with Infantas but to the southeast, and at San Luis, bearing about the same relationship to the Umir Hills uplift, are still more or less in the exploratory stage.

The four structures mentioned cover approximately 15,000 acres, on which there are at present 223 producing wells. Drilling has been better than 92 per cent successful since starting operations on this concession. Allowing 15 acres per well, which is 50 per cent more than good practice in the Mid-Continent fields, there is thus room for 1000 wells, which at the recent rate is a 10-year drilling campaign. This does not take into consideration the known deeper oil zones, which have not been prospected, but which are uniformly petroliferous at their outcrops to the eastward.

It is estimated that, with the enlarged pipe line capacity, as well as increased domestic consumption, the production for this country will be about 20,000,000 barrels for the current year of 1928. It is possible that if opened up the field could produce approximately 150,000 barrels per day.

The Colombian congress attempted to pass a new petroleum bill during the latter part of the year. This was written much in the spirit of the petroleum legislation of Mexico during recent years, and was in certain of its provisions probably inspired from that source. The bill failed of passage, and was carried over until the present year; but an emergency bill was passed during the last days of the session; which if it should be embodied later in the laws of Colombia will stop exploration work on part of those companies already in the country and deter any newcomers. In several specific instances this has already seen its effect.

The essential features of this emergency bill are (1) the ratification of the Yates contract; (2) the building of a refinery for government royalty oil; and (3) to extract from the owners of private lands or their lessees (oil companies) an additional 10 to 20 per cent royalty. To the extent that this bill is retroactive it is confiscatory in the same manner as certain Mexican legislation.

Colombia is the only South American nation whose territory is comparable (area for area) with that of Mexico, for the variety and richness of its natural resources. Like Mexico, its capital and ruling class is located within the mountainous interior of the country. Naturally enough, such groups often have a provincial point of view, combined with jealousy and fear of outside influences. Of recent years Colombia has made great strides in internal development and the future seemed to hold promise of a gathering momentum in that direction.

It is to be hoped that more liberal views will in the end govern their attitude toward those whom they are inviting to invest capital within their boundaries. It would be a pity should the potentially richest country bordering on the Caribbean decide by its actions to retain a medieval status. Meanwhile Venezuela, with less natural resources, is going ahead by leaps and bounds, and has already passed Mexico's rate of oil production, which it may soon double.

One of the most interesting phases of oil intrigues in Colombia the past year was the appearance of a large corps of geologists under the aegis of the Anglo-Persian Oil Co. Shortly thereafter an attempt was made to secure a blanket concession upon all federal reserve lands; which under the proposed law would include the Barco concession, as well as many privately owned lands whose subsoil rights were to be cancelled under retroactive legislation.

Apparently failing in this effort, negotiations of a similar nature were carried on by a H. I. F. Yates of London, whose principals were obviously the same Anglo-Persian Oil Co. The Emergency Petroleum bill allows for the ratification of a large concession around the Gulf of Darien at the mouth of the Atrato river, to Mr. Yates, but reading between the lines of its provisions one is led to suspect it is intended to cover all national lands. As the Anglo-Persian Oil Co. is partly owned by the British government, and as Mr. Yates' negotiations apparently dovetailed with certain British mining claims sponsored by that government, and as this concession is very close to the Panama Canal, the possibilities of future interesting developments are very good.

The author is indebted to Michael O'Shaughnessy for help in the preparation of this paper; particularly for recent developments since the former's trip to Colombia early in 1927. He has drawn freely from data contained in "South American Oil Reports", as well as personal communications from Mr. O'Shaughnessy.

*Consulting Engineer, Pittsburgh.

Technical Control of Refinery Processes

By Ernest B. Phillips*
and
Albert E. Miller†

Part 1

Introduction—Beginnings of Refinery Technology

THE pioneer refiners were concerned principally with distilling, dewaxing and decolorizing operations. The products produced were limited in number and the uses to which they could be put were few. Natural products from the very high grade crudes, then plentiful, supplied the domestic demand and no other markets were open.

As the time passed, other producing fields were discovered and crude oils of lower natural quality were made available. To refine these grades to a quality expected by buyers, refinery practice had to be changed and new methods found. At the same time the accidental discovery that crude residue could be cracked by dry distillation at atmospheric pressure to produce a much larger amount of lamp oil than had been customary, opened a new vista for the industry.

Export kerosene soon became the leading revenue products for all refiners and considerable new technic was added to refinery practice.

Typical refinery operations of 1900 were simple and were conducted with the single purpose of producing as much export kerosene as possible. Light naphthas and fuel oils were a drug on the market and every means was taken to hold the yields of these commodities to the lowest possible figures. Crudes were run for test bottoms, the overhead being cut for crude naphtha over to 52 degrees A.P.I. water white stock 52 to 42 degrees, prime white stock 42 to 38 degrees, gas oil 38 to 32 degrees, wax distillates 32 degrees down to the desired residue, with steam refined stock, flux or coke as the still residue.

Intermediate stocks were all steamstilled for such light naphthas as were wanted and the steamstill bottoms were included in the prime white stock. The water white stock was steamstilled to test and distillate fractions sent back to crude naphtha for redistillation. The prime white stock, plus the naphtha bottoms, was steamstilled to test and the almost worthless distillate, known as gas naphtha, was lost in the best possible way, usually by running it down some convenient river. Gas oil was sold as such and lubricating oil stocks were finished in ways suitable for producing engine oils and cylinder stocks.

Such laboratory control of quality of products as was carried out in the early days was confined to pure physical testing of commercial products. Lamp oils received the most attention and lubricating oils somewhat less. The laboratory staffs were headed by men from the refinery organizations and testers were recruited from the neighborhood. These men were trained simply to know whether a product met current specifications or not, and at that point their responsibilities ended.

No thought was given to yields and no equipment was supplied for determining whether quality could be made better. In fact, the laboratory staff was usually regarded as a nuisance by operating departments. Practically no attention was paid to the cost of producing certain products and very little accurate accounting was carried out.

With the turn of the century, however, developments within the petroleum industry came rapidly. The prolific Texas and Mid-Continent fields poured forth their floods of oil and ways had to be devised for handling these crudes possessed of entirely different characteristics from those which had hitherto been the only crudes available. Plants in operation in 1900 were in no shape to run the heavy oil from the Spindletop field. A new equipment had to be created before suitable refineries could be built.

For the first time in the history of the American petroleum industry the laboratory staffs were called upon to furnish data from which refinery units could be designed. This resulted in the construction of experimental laboratories and in the installation of semi-commercial equipment.

How well these first experimental plants fulfilled their destiny can be seen in the records of the older Gulf coast refineries. Such operations as reruns over lye and acid treating test lubricating oil distillates to obtain finished products do not seem unusual to us now, but they marked distinct advances when first practiced.

DURING this same period, 1905 to 1910, the first pipe lines from Oklahoma to the Gulf were being laid and mixed paraffin base crudes were being delivered to refineries in large quantities. These oils were not considered fit for the production of lubricating oil and were to a large extent only skimmed to produce light oils and the residues sold as fuel oils. The controlling factor in the world markets was still the production of export kerosene and all operations had to be planned with that fact in view. Gasolines, naphthas and fuel oils were by-products and could never be made of primary importance.

The above gives a very good picture of the condition of the American oil industry up to about 1912 or shortly before the outbreak of the World war. Practically every

*Chief chemist, Sinclair Refining Co.
†Process chemist, Sinclair Refining Co.

Necessity Brought in Technologists

WHEN the chemist and engineer began to appear in the refineries along in 1905 and 1910, they were not welcomed, say the authors of the accompanying paper. They were regarded as a nuisance. They have made their present place secure because they could and did show refiners the value of their services. Now they are indispensable.

This is a paper presented before the Petroleum Division at the New York meeting of the A. I. M. E., Feb. 20-23. Because it seems to us so valuable we are going to publish it in full. Because it is so long, we are going to publish it in three installments, of which this is the first.

Next week, the "bogey" workup to keep a check on refinery operations will be discussed.

oil refinery in the country had been built on designs sanctioned by long use. Almost over night, export kerosene was dethroned as the world's most important petroleum product and the hitherto practically worthless naphthas became the sources of greatest revenue. The industry was faced with the necessity of executing an "about face" in the system of handling crude oil.

Whereas before, good management had consisted of squeezing into export kerosene every drop of distillate possible, the new conditions demanded the maximum production of motor fuel.

From 1910 to the close of the war, little change in refinery equipment or operations was witnessed, but a new force was beginning to make itself felt. Wise managers had begun to fill their laboratory and engineering staffs with young technically trained men. These men brought with them a new viewpoint into the industry. They were chemists and engineers who were unhampered by the traditions of the industry and who were loath to believe anything was being done in the best manner or at the least cost possible The newcomers did not receive a cordial welcome from the old time operators, nor were they allowed at first to have much to say about refinery operations. Instead, experimental laboratories were built for them and they were told to produce results on a semi-commercial scale. History testifies how well these men did their work.

THE basic ideas underlying all of our present day practices were conceived in that period and each individual process was worked out on a semi-commercial scale before a single plant unit was designed. Such developments brought to the attention of refinery managers the vital importance of technical control of refinery operations and paved the way for the era of expansion which followed the war years.

At the end of the war many refinery plants in this country were in poor physical condition and the equipment in service was not suited for the class of work that a modern refinery had to do. During the boom years following, new and modern construction was the order of the day. The executive heads of many of the old companies realizing this, were willing to give over the active running of the oil industry to younger men of the new school but still maintained such a connection that their valuable experience and direction were still available.

New types of refining units were coming on the scene, and these units were in the hands of the new generation. Engineers and chemists were at hand who had received all of their training under the new conditions. The combination of these forces has made possible the great strides in

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refinery technology which we have witnessed in the last ten years.

Just as the manufacturers of lamp oil (prime white kerosene) had given impetus to the industry in the nineteenth century, the production of synthetic motor fuels furnished the inspiration in the twentieth. This time, however, the industry found itself with greater resources both in men and equipment than had been the case in the earlier period.

Technically trained men had gained experience in refinery practice from semi-commercial development work and were in position to build and operate complicated refinery units. The systems of operating on a laboratory scale where a close control of operations was maintained were bodily applied to the refinery when commercial units were put in operation. So much depended on positive control both from the standpoints of safety and yield that no refinery manager could be content with the old style methods of operating.

Success in special fields such as pressure cracking drew attention to the desirability of placing all refinery operations under similar control. The result has been that no modern refinery can stay in the game unless every operation is watched by a competent technical staff. So far as actual contact with refinery operations goes, the technical staff functions as an auditor, whose units of measure are yields and quality instead of dollars and cents.

Modern Methods of Technological Control

HAVING traced in a general way the progress of technical operations in refineries from early times, we can now pass to the consideration of a full scale technical staff suitable for a modern refinery. The chief executive officer of a company expects from his technical staff information along four definite lines which may be expressed as follows:

First, he wishes to know whether or not his present equipment and methods of operating are yielding products of full quality and in the amounts actually present in his charging stocks.

Second, whether the individual operations in his plant are being carried out in the quickest, cheapest and most efficient manner.

Third, whether new processes, apparatus or products offered him by outsiders have real merit and should be investigated, and

Fourth, it must be possible for him to have available the patent history of every process he is using or is being developed in his organization, as well as the same information for any piece of apparatus now in operation or which may be contemplated, or of any product which he is now producing or intends to produce.

In order that these four prime requisites may be taken care of, the technical staff may be divided into two main groups, one of which will deal with all matters relating to actual or proposed refinery practice, and the other with the outside investigations and patent searches.

As a center for operations of the above mentioned staff, a general laboratory should be provided equipped with all modern apparatus and having a personnel of competent oil inspectors and chemists. This group is charged with responsibility for the quality of all materials or products bought or sold by the company. Besides this routine work, men with special training should be available for detail work in any field in which the company may have an interest.

The chief functions of this unit are to keep close watch on the quality of all raw and finished products in the refinery and to furnish analytical data on material from all sources. Of almost equal importance is the manner of routine examination of competitive products and the recognition of all points of merit displayed by them.

Application of Small Scale Work-ups for Controlling Current Refinery Operations

AN ESSENTIAL factor in the scheme of technical control proposed above is the provision of an experimental plant. In it, small scale units designed to operate as nearly like refinery counterparts as possible, are fitted up so that any desired operation met with in the refinery itself may be carried out but on a much smaller scale. Samples ranging from one to 50 gallons in quantity may be required for these operations. Such an experimental plant had best be housed in a separate building designed to reduce fire hazards to a minimum. To this experimental plant are sent all samples of crude and intermediate products from which yields of commercial finished products are desired.

Various kinds of distillations, chemical treatment and filtration tests make up a large part of the work performed. The staff must consist of experienced stillmen and treaters who have had long contact with small scale work. They are charged specifically with determining potential yields of products from all actual or proposed refinery stocks. It is from these units that the basis data for the technical control of refinery operations is obtained.

The value of the class of work outlined in the above paragraph can best be illustrated by giving typical examples of method used in controlling certain major operations. As is well known, all producing companies in active fields maintain field scouts whose duty it is to collect samples of crude from every new pool discovered and forward them to the chemical laboratory. These samples are subjected to routine inspection for the purpose of classifying them and then they are worked up according to the refinery method which would be applied. Inspection reports on field crudes are prepared, types of which are shown below:

Typical Work-ups Covering Different Kinds of Crude Oils on Small Experimental Scale

A. Crude from Appalachian Fields

I. Tests on Crude

Gravity	41.2
Flash	RT
Pour	0
BS	0.2%
Sulphur	0.12%
Color	Amber

500 cc. Distillation

Over	154°F.	
10%	253	68.4 gr
20	320	59.3
30	392	52.2
40	472	47.1
50	547	42.7
% at 221		5.4%
284		14.9
392		30.0
420		31.5
440		34.0

II. Tower Distillation of Crude

Charge 100% Crude ..... Gravity 41.2

Cut	Grade	% Crude	Gravity
Over to 46.7	400 End Distillate	35.0%	59.1
Over to 45.4	420 End Distillate	38.0	57.9
Over to 44.4	437 End Distillate	41.0	56.8
Over to 43.4	450 End Distillate	43.0	56.2
Bottoms	Reduced Crude	55.6	32.2
Loss		1.4	
		100.0%	

Tests on Products

Grade	400 End	420 End	437 End	450 End	Reduced Crude
Gravity	59.1	57.9	56.8	56.2	32.2
Over	124	126	127	130	500
10%	184	166	191	194	
20	212	218	225	226	
30	234	241	250	252	
40	255	266	274	277	
50	276	287	298	307	
60	296	310	322	333	
70	315	336	353	360	
80	339	359	378	390	
90	364	386	406	419	
End	399	420	437	450	
% at 221	24.0	21.5	18.5	18.0	
284	54.0	49.0	44.5	42.5	
392	....	92.0	85.0	81.0	

The yields of kerosene, fuel oil, wax distillate and cylinder stock from this crude are so well known that further working of reduced crude is not necessary.

B. Crude from Mid-continent Fields

I. Tests on Crude

Gravity	35.0
Flash	RT
BS	0.3%
Sulphur	0.39%
Color	Dark Green

500 cc. Distillation

Over	136°F.	
10%	194	75.2 gr.
20	326	60.0
30	409	51.0
40	503	43.3
50	602	37.6
50% Bottoms		23.2

II. Towerstilling Crude

Charge 100% Crude ..... Gravity 35.0

Cut	Grade	% Crude	Gravity
Over to 43.7	400 End Distillate	29.0%	59.3
43.7 to 40.5	41 Kerosene	12.0	41.7
Over to 41.9	91/392 Goods	33.0%	57.3
41.9 to 40.9	41 Kerosene	5.0	41.6
Over to 41.0	450 End Distillate	36.0%	55.0
Bottoms	Reduced Crude	62.5	26.0
Loss		1.5	
		100.0%	

I. Tests on Products

Gasolines

Grade	400 End	91/392 Goods	450 End	7% Casinghead 93% 91/392 Goods
Gravity	59.3	57.3	55.0	58.8
Over	130	135	140	113
10%	169	180	188	168
20	206	212	221	202
30	230	237	250	231
40	254	264	274	252
50	276	288	304	281
60	298	312	332	312
70	314	338	358	338
80	333	365	384	365
90	359	390	418	390
End	399	430	452	430
% at 221	26.0	23.0	20.0	27.0
284	54.0	48.0	43.0	51.0
392	....	91.0	83.0	91.0

Kerosenes

After Making	400 End	91/392 Goods
Gravity	41.7	41.6
Flash TCC	120	120
Viscosity	460	465
Initial	380	394
10%	400	418
20	425	435
30	434	442
40	440	446
50	448	450
60	452	454
70	457	457
80	464	462
90	478	478
End	496	488

C. Gulf Coast Crude

I. Tests on Crude

Gravity	21.6
Flash	195
Fire	235
BS	0.2%
Pour	0
Sulphur	0.35%

II. Distilling Crude

Charge 100% Crude ..... Gravity 21.6

Cut	Grade	% Crude	Gravity
Over to 26	Gas Oil	29.0%	29.6
26 to off	Lub Distillate	59.6	20.7
Bottoms	Flux	10.3	12.1
Loss		1.1	
		100.00%	

III. Rerunning Lub Distillate Over Lye

Charge 59.6% Crude ..... Gravity 20.7

Cut	Grade	% Charge	% Crude	Gravity
Distillate	Lub Stock	94.0%	56.0%	21.0
Bottoms	Caustic Fuel	5.0	3.0	9.0
Loss		1.0	0.6	
		100.0%	59.6%	

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IV. Reducing Lub Stock for Test Bottoms

In order to work up lub stock from Section III, a pre-determined ratio of production of different grades must be adopted. This is usually taken as average of plant production over a period of time. The breakup desired in this particular case is 1.7 parts 750 stock, 12.8 parts 500 stock, 17 parts 300 stock and 1.7 parts 200 stock. On the above basis the lub stock produced under Section III will show:

1. Reducing for 750 Stock

Charge 56.0% Crude.....Gravity 21.0

Cut	Grade	% Charge	% Crude	Gravity
Distillate.....	Lub Stock	45.0%	25.2%	23.4
Bottoms.....	750 Stock	54.0	30.2	18.8
Loss.....		1.0	0.6	
		100.0%	56.0%	

1.7% of the crude was set aside as 750 stock and remainder of distillate and bottoms mixed for new charging stock.

2. Reducing for 500 Stock

Charge 53.7% Crude.....Gravity 21.1

Cut	Grade	% Charge	% Crude	Gravity
Distillate.....	Lub Stock	35.0%	18.79%	24.2
Bottoms.....	500 Stock	64.0	34.37	19.0
Loss.....		1.0	0.54	
		100.0%	53.70%	

500 stock equivalent to 12.8% of crude was set aside for this grade and distillate mixed back with the residue.

3. Reducing for 300 Vis. Stock

Charge 40.37% Crude.....Gravity 21.6

Cut	Grade	% Charge	% Crude	Gravity
Distillate.....	Lub Stock	30.0%	12.11%	25.4
Bottoms.....	300 Stock	69.0	27.86	20.2
Loss.....		1.0	0.40	
		100.0%	40.37%	

300 vis. stock equivalent to 17.04% of crude was held out and balance mixed with distillate fraction.

4. Reducing for 200 Vis. Stock

Charge 22.93% Crude.....Gravity 22.7

Cut	Grade	% Charge	% Crude	Gravity
Distillate.....	Lub Stock	40.0%	9.17%	26.4
Bottoms.....	200 Stock	59.0	13.53	20.5
Loss.....		1.0	0.23	
		100.0%	22.93%	

200 vis. stock equivalent to 1.7% of crude was set aside for this grade and balance mixed with distillate

5. Reducing for 100 Vis. Stock

Charge 21.0% Crude.....Gravity 22.9

Cut	Grade	% Charge	% Crude	Gravity
Distillate.....	Gas Oil	19.6%	4.12%	27.2
Bottoms.....	100 Vis Stock	79.4	16.67	21.4
Loss.....		1.0	0.21	
		100.0%	21.00%	

Tests on Products

Grade	750 Stock	500 Stock	300 Stock	200 Stock	100 Stock
Gravity.....	18.8	19.0	20.2	20.5	21.4
Flash.....	385	365	335	315	280
Fire.....	445	425	380	360	315
Vis. at 100.....	768	522	314	213	110
Pour.....	5	0	0	0	0

Summary of Products

Grade	% Crude	Gravity
Natural Gas Oil.....	29.00%.....	29.6
Cracked Gas Oil.....	4.12.....	27.2
100 Vis. Stock.....	16.67.....	21.4
200 Vis. Stock.....	1.70.....	20.5
300 Vis. Stock.....	17.04.....	20.2
500 Vis. Stock.....	12.79.....	19.0
750 Vis. Stock.....	1.70.....	18.8
Fuel.....	13.30.....	11.1
Losses.....	3.68	
	100.00%	

With reports of the kind shown above refinery executives are able to keep fully informed on the quality of current new production and to pick, when possible, grades best suited for the plant. Over a period of years a file will be accumulated which includes type crude oils from all over the world and any new pool discovered can be placed with relation to all others.

(To be continued)

Two more oil men who will discard their automobiles for the airplane. On the left, H. B. Jordan, special representative at Atlanta, Ga., of the Pan American Petroleum Corp., who has just landed safely after his first flying lesson from M.A.C. Johnson, agent at Augusta, Ga., for the same company. Mr. Johnson is on the right. Both expect to cover their territories by this modern transportation method in the future.

Maine Jobbers Meet During Auto Show

GARDINER, Me., Feb. 27.—Auto mobile show week was chosen by the Maine Independent Oil Dealers Association for its first meeting of the year on Feb. 1. The meeting was held at Portland.

Plans for the current year were discussed, following the luncheon at the Lafayette Hotel, according to Theodore E. Emery, president of the Kennebec Oil Co., Augusta, and president of the association.

Louis D. Pierce, president of the Pennsylvania Petroleum Products Co., Providence, R. I., was on hand to suggest a booth for the Maine dealers in which to extol Maine's attractions to delegates to the New England jobbers convention in Boston, March 14 and 15. This suggestion was accepted by the Maine oil men.

A banquet at which 80 members, oil supply and equipment men were entertained, completed the meeting. Frank A. Balantine, manager of the American Automobile Association at Providence, was the speaker.

N. Dakota Marketer Incorporates

DEVILS LAKE, N. D.—The Lake Region Oil Co., with headquarters here, was incorporated on Jan. 1 and will now operate under the name of Lake Oil Co., Inc. Incorporation was for $25,000. W. H. Edgar is president and T. E. Green, secretary and treasurer.

The company will erect bulk stations at Church's Ferry and Warwick, N. D. on March 1.

CLEVELAND, Feb. 27.—"A.S.M.E. Research Activities in 1927" has been issued by the American Society of Mechanical Engineers, 29 W. 39th St., New York. The booklet tells of the purpose, the scope and the organization of the society.

Service for Oil Burner To be Discussed

NEW YORK, Feb. 25.—One of the important topics that will be discussed at the annual convention of the American Oil Burner Association on April 3, 4 and 5, will be plans for co-operation by oil producers and electric light and power companies in serving users of oil heating apparatus. The convention will be held at the Hotel Stevens, Chicago.

An official of a large oil company, whose name has not yet been announced, will take on the use of fuel oil by home owners and commercial buildings, and a representative of a large electrical company will speak on the relation of the central station to the oil heating industry.

One of the features of the meeting will be the showing of the Bureau of Mines film "The Story of Petroleum".

Edward James Cattell will be the principal speaker at the annual dinner on the evening of April 4. Leod D. Becker, managing director of the association and of the Oil Heating Institute, will present his annual report.

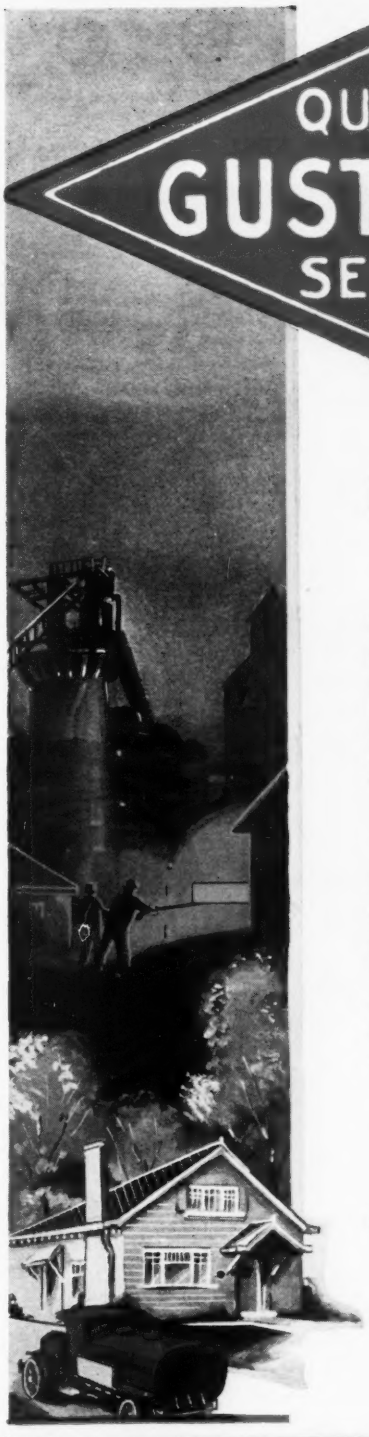
Among the subjects on the program are: "Why We Have General Trade Practices"; "Are We Making Progress in Fundamental Engineering"; "Installation Regulations and Other Factors in the Cost of Installed Equipment"; "What Competition May We Expect from Other Fuels"; "Organizing a Sales Force"; "The Selection and Training of Dealers"; "The Manufacturer and Service"; "The Importance of a Complete Line of Equipment"; "The Relation of the Indirect Heater to Oil Burners in the Heating of Domestic Water"; "Automatic Oil Heating Service as Distinguished from the Oil Burners for Sale"; "CO_2 and Its Relation to Burner Adjustment"; and "What Price Service".

An equipment exhibit will be shown in connection with the convention.

Many Exhibits for A. G. A. Convention

NEW YORK, Feb. 24.—The exhibition of equipment and appliances in conjunction with the annual convention of the Natural Gas department of the American Gas Association at Dallas May 7 to 10 will be one of the largest if not the largest ever held by the natural gas industry, according to N. C. McGowen, Palmer Corp., Shreveport, chairman of the department.

Present indications point to a larger exhibition than was held last year at the Cincinnati meeting, when 22,000 square feet of space were used, says Mr. McGowen. Advance inquiries made by manufacturers regarding space in the exhibit reveal much interest being shown.



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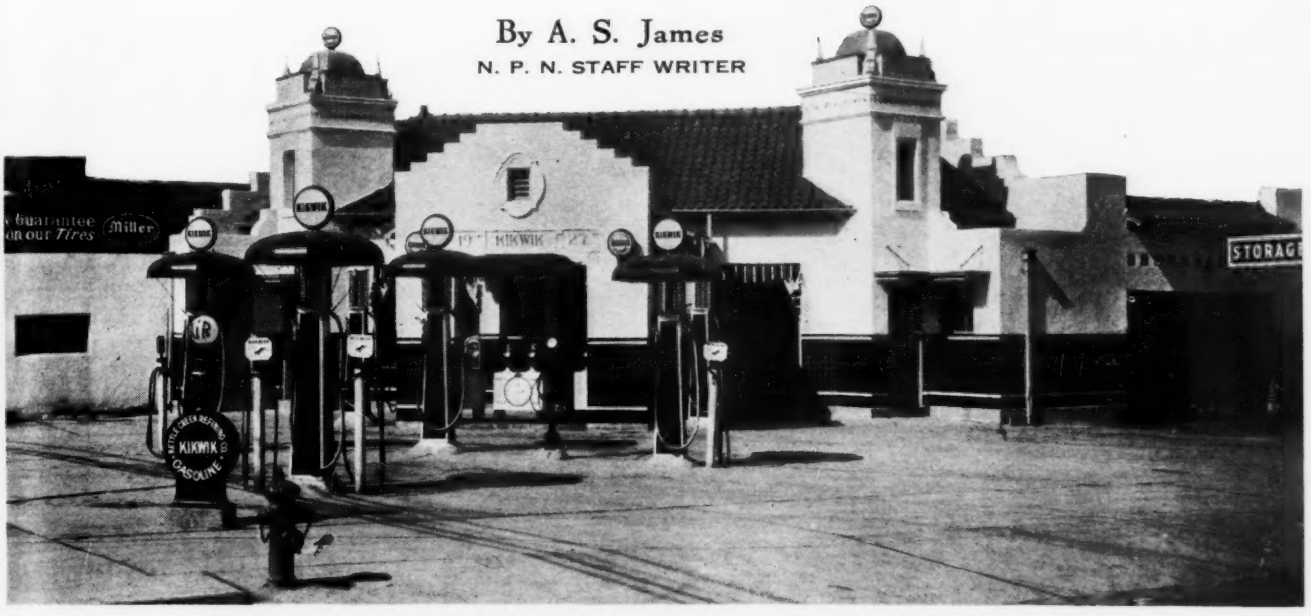
Artistic Station Handles Variety of Services to Motorist

By A. S. James
N. P. N. STAFF WRITER



Service station owned and operated by the Kettle Creek Refining Co. at El Dorado, Ark.

EL DORADO, Ark., Feb. 25

BACK in the days before the oil boom, when this city was just "the Arkansas El Dorado", the town's first filling station was built at the corner of Elm and Jefferson streets, opposite the courthouse in the public square.

The station was a two-pump affair, and the only times an auto drove on any pavement in the town was when it was run into the station. None of the streets were paved.

Then came the oil boom. The station served its purpose during those hectic days, but as the city grew and miles of paving were laid, the station became almost an eyesore. The Kettle Creek Refining Co., of which W. B. Hassett of Tulsa is president, meanwhile took over the station and operated it. Gasoline sales were around 300 gallons a day.

After the boom days were over and the city had a chance to breathe again, Mr. Hassett decided to replace the old eyesore with a modern service station. He instructed E. C. Prator, general manager of his interests in Arkansas, to plan the station. It was completed in July, 1927. Since that time the old courthouse has been razed and construction on a new $500,000 building started.

The station is of stucco construction, whisk-broom finish, painted white. The wainscoting is of black glazed tile, four feet high, with two white stripes. The roof is of red tile. The awnings are red with white stripes.

There are six umbrella type pumps, each painted red with white trimming. The water hose stands are white with red caps, and on top of each is a small white and red sign displaying the "kicking mule" and the name of the company's brand of gasoline and kerosene "Kikwik." There is a large air hose connection in front of the station and four other air hose connections conveniently located. The air connections have automatic control bells.

Five driveways give easy access to the pumps. Two driveways are under the canopy at the front center of the building. The lot on which the station is located has a frontage of 75 feet on Jefferson street, 100 feet on Elm street, and is 100 feet deep.

The wall at the extreme right (left hand side of picture) is set back far enough to permit parking of several cars. The small door at the right of the building proper is the entrance to the ladies' rest rooms, which are furnished in mahogany and wicker, and are modern in every way. Next to the rest room is a tire display room. There is a large window which cannot be seen in the picture, which is used as a display window. Back of it is the tire storeroom. There is an archway under the canopy which leads to a small vestibule, with doors leading to the tire display room, the storeroom, and to the auto accessories sales room and storeroom which are located in the center and to the left side of the building. The large window showing in the picture is used for accessories, display. The small door in the tower is the entrance to the men's rest room.

At the extreme right of the picture is a large door opening into the rear of the building. All of the greasing and washing is done in this large room. There also is an electrically equipped vulcanizing plant, washing racks, electrically operated greasing equipment, a rest room for colored persons, and a small space for automobile storage.

Since the accompanying picture was taken a large electric sign 42 feet long and 24 feet high has been erected over the station. The top line spells the words "Miller Tires." Each letter is four feet high. The second line reads "Kikwik Gasoline," also in letters four feet high. Four hundred and seventy-five globes are used to illuminate the sign.

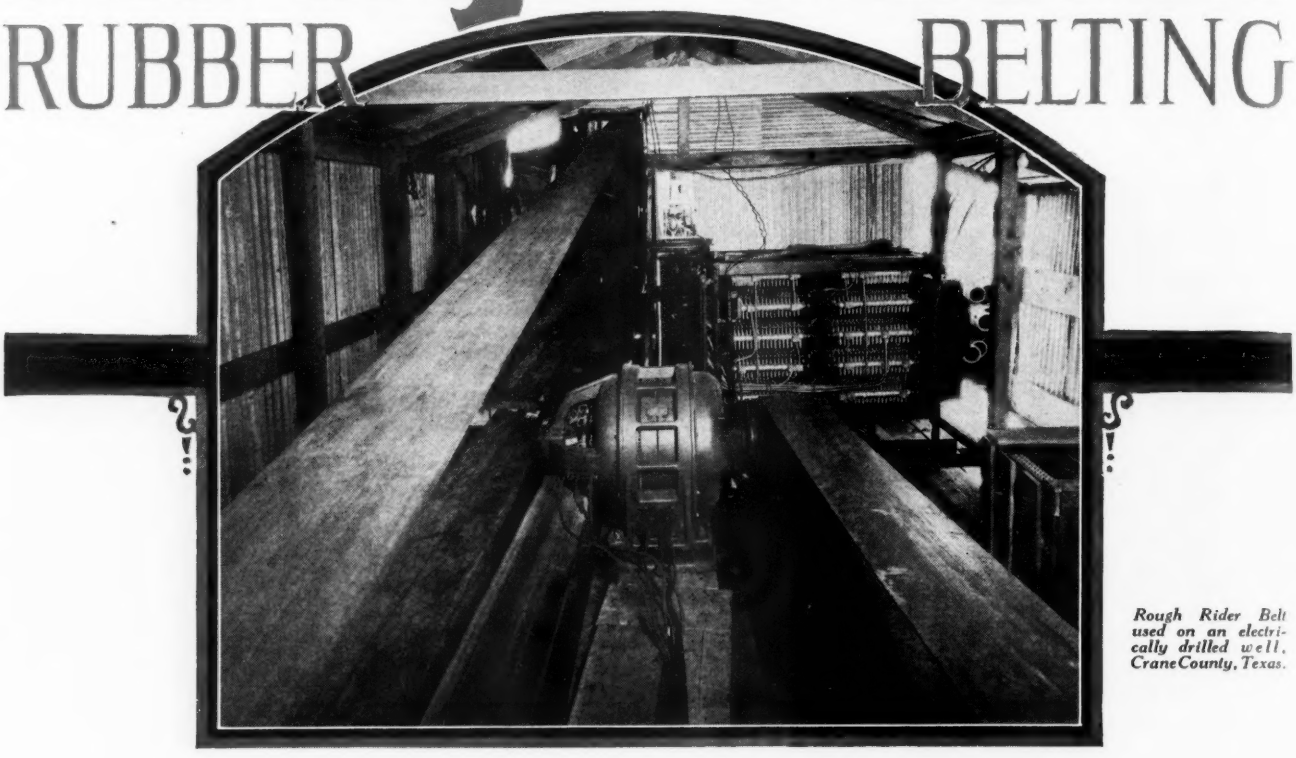
CLUSTERS of lights are located under the eaves, while the pump umbrellas are lighted from the under side.

With the large sign and the pump and station lights, the building presents an unusually attractive appearance at night.

Twenty-four hour service is maintained at the station. At the present time the company has a crew of nine: a manager, his assistant, two clerks and five negroes.

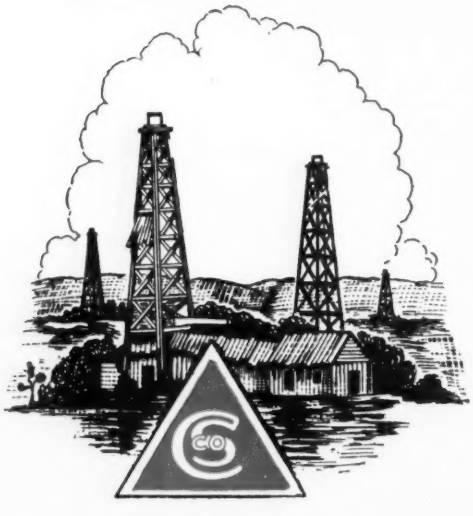
The company also operates tank trucks in Union county. The gasoline sales at the station last month averaged 1,000 gallons a day, while the gallonage in the county brought the total for the month up to around 70,000 gallons.

Rough Rider RUBBER BELTING



Rough Rider Belt used on an electrically drilled well. Crane County, Texas.

"Grew up in a TOUGH Country"



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CONTINENTAL

Mules are First Production Material Needed in Winkler County

By Paul Wagner

N. P. N. STAFF WRITER

THIS is the fourth article in the series by Staff Writer Wagner based on data collected on a recent 1,000-mile auto trip through west Texas. The series started in Feb. 8 issue of NATIONAL PETROLEUM NEWS. *The preceding article in the Feb. 22 issue described developments in the University-McElroy district.*

WINK, the newest and perhaps most interesting oil field boom town of west Texas, encroaches on the western edge of the Hendricks development, Winkler county, south of the center of a line drawn from northwest to southeast on the map. It is reached by motor car or truck from Pyote, on the Texas & Pacific railroad, some 18 to 20 miles southwest; or, if that road into the area is not sufficiently onerous, one may drive in from Monahans, another T. & P. railroad point to the east of Pyote.

The writer has related in an earlier episode of his trip, "Detouring west Texas," how he reached Wink in a motor car, accompanied by a traveling companion, same being a male. This episode, therefore, will be devoted to a discussion of Wink, the town, and Hendricks, the field.

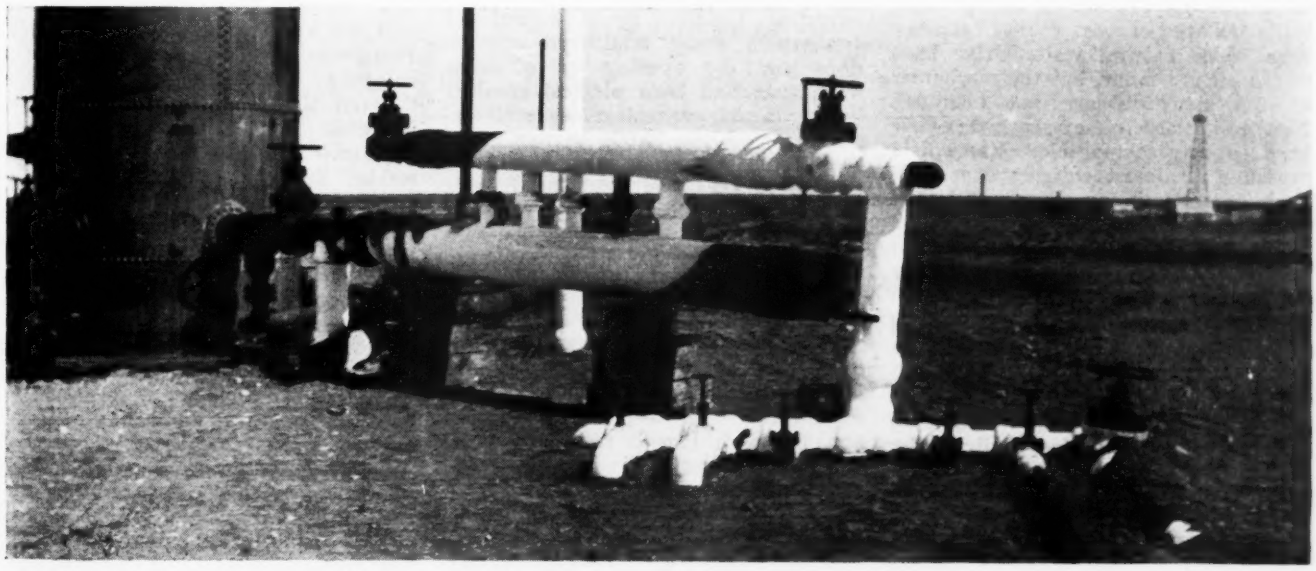
It is evident, from the number of mules required to effect transportation among the shifting sand dunes of the development area, that Wink is far removed from the classification of a one-horse town. As a matter of fact, it is an especially well organized community; which, in view of the natural difficulties overcome, is remarkably equipped to serve its several thousand citizens and visitors.

Ice encrusted by expansion on 6⅝-inch, 3000 pound Hughes valve, with which well-head of Humble Oil & Refining Co.'s A-2 Hendricks gas well was equipped in Winkler County oil field. Well made 105,000,000 cubic feet of gas daily with 1370 pounds rock pressure, at maximum

Wink boasts the convenience of electric lights and power, supplied by the West Texas Utilities Co., which has made current available for almost all the remote oil areas of the salt basin producing province west of San Angelo and midland. There are sufficient hotels to prevent sleeping discomforts being intolerable and, as in other parts of the west Texas region, good food is plentiful. Entertainment is provided at motion picture shows and the stores carry adequate stocks of merchandise.

THERE are coming into use in mushroom towns of west Texas, such as Wink, what are known as cottage camps, modeled after the bungalow courts lately popularized by that part of Iowa and Nebraska which resides in, or adjacent to, Hollywood. They are smaller, of course, some of them consisting of a single room. In Wink, as in southern California, the population shifts in and out.

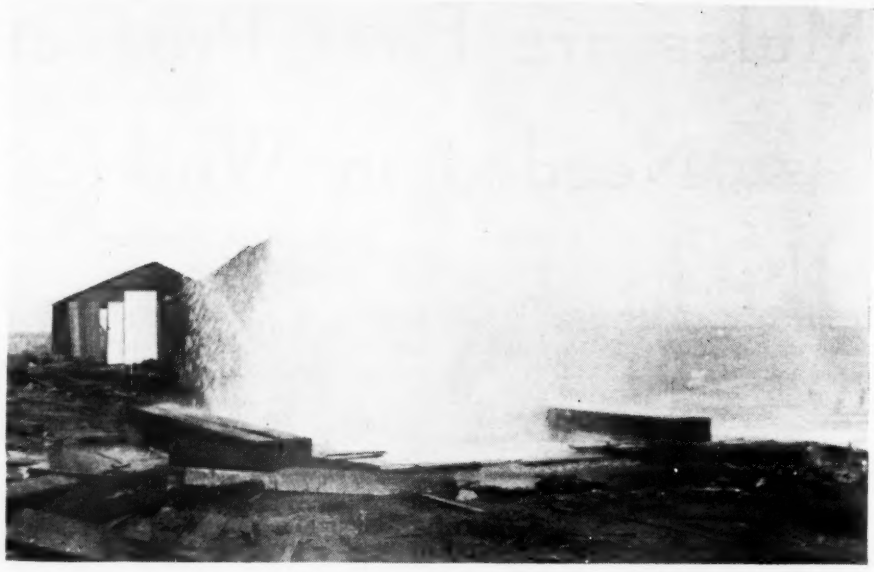
Northeast of Wink about seven miles is Kermit, the seat of government of Winkler county. It is somewhat behind Wink in its development, but it is still fighting manfully for its place in the sun, which heavenly orb is sometimes seen through the dust. Kermit has recently announced a short line railroad is practically assured from Wickett, on the Texas & Pacific, another recent addition to the



Humble Oil & Refining Co.'s A-2 Hendricks gasser, Winkler County, Tex., showing ice formed by expansion on connections at trap; well making 105,000,000 cubic feet daily under 1370 pounds pressure

roster of west Texas communities.

A tangle before the Interstate Commerce Commission is in the offing because of plans for this railroad, Wink contending it should be constructed from Pyote via that oil field town to Kermit. Whatever the outcome, Kermit existed before Wink was ever thought of, albeit the settlement consisted of only a half dozen houses. After going through those lean years when it was impossible to find enough qualified citizens to empanel a jury in Winkler county, Kermit may be expected to fight manfully against being left in the discard.



Amerada Petroleum Corp.'s Walton gasser, Sec. 48, Block B-26, flowing wild 50,000,000 to 75,000,000 cubic feet daily in Hendricks field

DEVELOPMENT in the Hendricks field has been discussed at some length in these columns at various times. It will be treated here mainly in perspective, so as not to encroach upon week to week operations or current economic influence of the field.

Eventually, the field may be found to cover about 16,000 acres, equaling the Yates shallow pool of Pecos county in scope of operations. Although constituting an immense crude oil reserve for future recovery no such amazing ultimate yield figures have been set up for this deep lime drilling area as were estimated for the Yates shallow field.

Students of Yates field producing conditions have estimated a possible 500,000,000 barrels ultimate yield, based on natural water drive flushing the oil through an average of more than 50 feet of pay horizon, plus 25 per cent porosity. Original estimates of 155,000,000 barrels ultimate yield for Hendricks field were based on a lower acreage total than now considered probable of production. The field is not expected, however, to reach as high a final recovery as Yates.

Although the Hendricks field producing lime is itself porous it is not so uniformly productive of "gusher" wells as the Pecos county shallow area. The natural water drive back of the oil is similar, but the mechanics of the structure are not identical. Neither is the effect of the hydrostatic head entirely comparable. Yates field pressure is almost entirely dependent on hydrostatic influence, except in the very top of the structure, whereas many high pressure gas wells have been completed in the Winkler county area.

One of the greatest Hendricks field gassers is the A-2 well of the Humble Oil & Refining Co., in the southeast corner of the northeast quarter of sec. 34, block B-5, which made a maximum of 105,000,000 cubic feet daily under pressure of 1,370 pounds to the square inch. Accompanying pictures show ice formed by expansion at the well-head, which is equipped with a 6⅝-inch 3,000-pound, Hughes valve; and on the fittings, lines and separator, about 300 feet away. This ice is more than an inch in thickness.

Two miles east and northeast of other Hendricks field production, in sec. 48, block B-26, the Amerada Petroleum Corp's. test on the Walton tract had a gas blowout before the drill reached the possible oil producing level in the lime formation. It was closed in after pouring from 50,000,000 to 75,000,000 cubic feet into the air daily, accompanied by an estimated 16,000 barrels of water from an upper horizon.

Water problems in the field, resulting both from encroachments at certain pay levels and from the escape of gas into shallower horizons above the lime, have been discussed elsewhere in these columns in an article devoted especially to the subject.

HENDRICKS field had roundly 50 wells to its credit at the end of 1927, producing roughly 1275 barrels average and pinched below their potential yields. By the end of January a dozen additional completions and the opening up of some wells that had been pinched resulted in production reaching a level between 80,000 and 90,000 barrels daily. The fields potential was considered to be upwards of 150,000 barrels daily. About 100 operations ranging from locations to wells nearing completion are under way in the area.

The field, which had produced roundly 2,500,000 barrels prior to Jan. 1, 1928, is still without trunk pipeline outlets, although short systems have been built to tank car loading racks at Monahans, Wickett and Pyote, on the Texas & Pacific railroad. Steel storage constructed in the field approximates 2,000,000 barrels and additional tankage being built totals about 1,650,000 barrels of room.

Development has been retarded entirely by physical limitations, there being no such prorating agreement as in the Yates field where operators are keeping all but about 50,000 barrels of their daily potential production in below-ground reservoirs.

PIPELINE projects from the Hendricks field to the railroad are summed up in the following construction notes:

American Petroleum Co.—One 6-inch welded line in operation from sec. 35, block B-5, to sec. 81, block F, one and a half miles east of Pyote, where the company owns a 26-car capacity loading rack. Capacity of the line is 14,600 barrels daily under 700 pounds pressure.

West Texas Pipeline Co., subsidiary of Atlantic Oil Producing Co.—One 10-inch welded line under construction from sec. 31, block B-5, to tank farm at Midland, Texas, approximately 70 miles east. The capacity of this line is 30,000 barrels or more daily, at 650 pounds working pressure. Atlantic will use this line for gathering its own oil and crude of the Magnolia Petroleum Co., with which it has a shipping agreement for an outlet through the Magnolia trunk east of Midland.

Humble Pipeline Co.—One 8-inch welded line under construction from sec. 8, block B-12, to Monahans thence southeasterly to eastern Crane county, where it will converge with University pool facilities into a 10-inch line the last 13 miles into McCamey.

Independent Oil & Gas. Co.—One 8-inch welded line completed from sec. 34, block B-5, to sec. 81, block F, where 80-car loading rack is being built on Texas and Pacific railroad, east of Pyote.

Shell Pipeline Corp.—One 6-inch line completed and another 6-inch line building from sec. 40, block B-5, to 40-car capacity loading rack at Monahans. At least one of these lines will be connected up with the Shell's

McCamey-to-Healdton 10-inch trunk pipe line now under construction.

Southern Crude Oil Purchasing Co.—One 6-inch line operating from sec. 6, block B-12, to sec. 20, block F, near Wickett, where 52-car capacity loading rack is located.

The Texas Co.—Plans building 8-inch line from Hendricks field leases to loading rack at Monahans.

Ed A. Landreth Interests—A short pipe line completed from field to railroad, probably near Monahans, for loading crude contracted to New Orleans Refining Co., shipments to begin April 1.

AS LATE as the end of January the Southern, Shell and American companies were the only interests making regular shipments of Hendricks field crude via tank cars. The Southern was averaging about 15,000 barrels daily, in contrast with quantities totaling from 20,000 to 30,000 barrels average in October and November. American was averaging about 5,600 barrels as compared with less than 3,000 barrels daily in December. The Shell-Roxana interests were shipping nearly 12,500 barrels daily, comparing with about 9,000 barrels average in December.

American's shipments were mainly to itself at Houston and the Rio Grande Oil Co., at El Paso, although a few tank cars of crude were moved to miscellaneous destinations. Shell-Roxana consignments were to the Roxana Petroleum Corp. refinery at Woodriver, Ill., and the New Orleans Refining Co., at Destrehan, La.

Southern Crude's shipments were to various destinations, including in December 204,000 barrels total to New Orleans Refining Co.; 141,000 barrels to Standard Oil Co. of Indiana at Whiting, nearly 54,000 barrels to Sugar Creek, 53,000 plus barrels to the Indiana company's Woodriver plant; 61,000 barrels to New Orleans Refining Co., at Goldsboro; 42,000 barrels to Chalmette Refining Co., in the New Orleans district; and smaller quantities to H. H. Cross, Brownfield & Campton, Swiftsure Petroleum Co., and the San Angelo Refining Co.

(To Be Continued)

MIDLAND, Tex., Feb. 25.—An aerial survey of the Crane, Upton, Pecos and Winkler county fields of West Texas will be made during the next few weeks. Maps and photographs will be made by the Fairchild Aerial Surveys. Midland is the base of operations.

AMARILLO, Tex., Feb. 25.—Contracts totaling about $2,000,000 have been let for the construction of a gas line by the West Texas Gas Co., a subsidiary of the Prairie Oil & Gas Co., and for additional telephone and telegraph lines to serve the towns from Lubbock to Midland.

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Gasoline Consumption Up 11.4% In 1927; Two States Decrease

NEW YORK, Feb. 25

A TOTAL of 467,016,000 gallons of gasoline was consumed during December, 1927 by motor vehicles in 35 states having gasoline tax laws or gasoline inspection laws, according to reports made by oil jobbers and marketers to the American Petroleum Institute. This is an increase of 46,662,000 gallons, or 11.1 per cent, over December, 1926.

Gasoline consumption for the year ended December, 1927 in the 35 states totaled 6,092,132,000 gallons, which is an increase of 623,920,000 gallons, or 11.41 per cent over 1926. This percentage change figure is not comparable for previous years due to the difference in the number of states reporting.

Only two states during 1927 showed decreases in consumption, these being Arkansas, with a decrease of 714,000 gallons, or 0.71 per cent; and Florida, with a decrease of 39,020,000 gallons, or 13.60 per cent.

Four states showed more than 20 per cent increase in consumption during the past year. Those states were: Arizona, 26.46 per cent; New Mexico, 23.46 per cent; Delaware, 21.40 per cent; and Maine, 20.24 per cent.

The smallest percentage of increase was 8.05 per cent recorded by Idaho.

Average increase during 1927 for 39 states, including California, Montana, Pennsylvania and Tennessee which report their figures quarterly, was 13.412 per cent.

Among the 39 states reporting, these states held the five highest places in amount of gasoline consumed by motor vehicles during 1927:

	Total	Daily average
California	1,017,681,000	2,788,000
Ohio	763,094,000	2,091,000
Pennsylvania	684,097,000	1,874,000
Texas	591,447,000	1,621,000
Indiana	347,757,000	953,000

Arizona's gasoline consumption in December, 1927, gained 49.65 per cent over December, 1926. Other states showing the largest gains in December over December, 1926, were: New Hampshire, 38.84 per cent; Maine, 33.22 per cent; Delaware, 32.83 per cent; Kentucky, 28.03 per cent; New Mexico, 27.81 per cent; Wyoming, 22.31 per cent; and West Virginia, 21.18 per cent.

These four states recorded decreases in consumption in December, 1927, as compared with December a year ago: North Dakota, 15.93 per cent; Minnesota, 7.1 per cent; South Dakota, 5.51 per cent; and Missouri, 4.48 per cent.

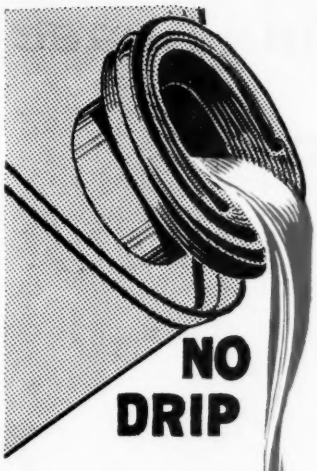
Gasoline consumption figures by states for December, 1927 and for the year are:

Gasoline Consumption—2

	Tax Per Gallon, Cents	Month of Nov., 1927 Gallons	Month of Dec., 1927 Gallons	Month of Dec., 1926 Gallons		12 Months Ended with Dec., 1927 Gallons	12 Months Ended with Dec., 1926 Gallons	
Alabama	4	13,358,000	12,501,000	11,082,000	+12.80	149,572,000	127,932,000	+16.92
Arizona	4	4,321,000	4,521,000	3,021,000	+49.65	41,237,000	32,609,000	+26.46
Arkansas	5	(a) 9,170,000	8,216,000	8,172,000	+ 0.54	99,394,000	100,108,000	— 0.71
Delaware	3	2,167,000	1,946,000	1,465,000	+32.83	24,273,000	19,993,000	+21.40
District of Columbia	2	4,839,000	4,750,000	4,218,000	+12.61	57,804,000	51,001,000	+13.34
Florida	5	19,398,000	21,022,000	25,135,000	—16.36	247,951,000	286,971,000	—13.60
Georgia	4	17,186,000	17,035,000	14,820,000	+14.95	192,078,000	170,204,000	+12.85
Idaho	4	3,565,000	2,668,000	2,385,000	+11.87	42,594,000	39,420,000	+ 8.05
Indiana	3	33,738,000	30,435,000	25,624,000	+18.78	347,757,000	305,984,000	+13.65
Iowa	3	25,365,000	19,530,000	16,949,000	+15.23	284,320,000	251,004,000	+13.27
Kansas	2	21,512,000	19,182,000	17,482,000	+ 9.72	270,615,000	240,817,000	+12.37
Kentucky	5	(a) 10,384,000	9,354,000	7,306,000	+28.03	118,273,000	103,849,000	+13.89
Louisiana	2	13,414,000	13,194,000	11,921,000	+10.68	151,606,000	135,429,000	+11.94
Maine	4	(a) 6,282,000	3,842,000	2,884,000	+33.22	74,732,000	62,152,000	+20.24
Minnesota	2	24,937,000	14,515,000	15,625,000	— 7.10	289,735,000	266,147,000	+ 8.86
Missouri	2	26,694,000	24,717,000	25,878,000	— 4.48	292,000,000	290,495,000	+ 0.52
Nebraska	2	14,478,000	12,610,000	11,177,000	+12.82	169,669,000	152,787,000	+11.05
Nevada	4	1,018,000	930,000	820,000	+13.41	12,720,000	10,840,000	+17.34
New Hampshire	3	3,766,000	3,253,000	2,343,000	+38.84	45,722,000	38,922,000	+17.47
New Mexico	5	2,847,000	2,551,000	1,996,000	+27.81	30,654,000	24,757,000	+23.46
North Carolina	4	21,053,000	20,503,000	17,661,000	+16.09	219,583,000	194,662,000	+12.80
North Dakota	2	5,941,000	2,290,000	2,724,000	—15.93	88,657,000	75,971,000	+16.70
Ohio	3	62,730,000	58,036,000	50,833,000	+14.17	763,094,000	680,157,000	+12.19
Oklahoma	3	21,228,000	21,525,000	19,081,000	+12.81	251,462,000	214,363,000	+17.31
Oregon	3	(a) 10,291,000	9,478,000	8,431,000	+12.42	130,885,000	114,758,000	+14.05
Rhode Island	2	4,984,000	4,735,000	4,181,000	+13.25	61,436,000	55,223,000	+11.25
South Carolina	5	10,369,000	9,055,000	7,772,000	+16.51	102,476,000	90,113,000	+13.72
South Dakota	4	7,403,000	3,841,000	4,065,000	— 5.51	87,975,000	75,477,000	+16.56
Texas	3	54,131,000	50,985,000	42,995,000	+18.58	591,447,000	514,641,000	+14.92
Utah	3½	3,151,000	2,832,000	2,512,000	+12.74	41,278,000	35,916,000	+14.93
Virginia	4½	14,405,000	13,945,000	11,698,000	+19.21	166,782,000	142,866,000	+16.74
Washington	2	16,252,000	14,983,000	14,029,000	+ 6.80	203,167,000	185,037,000	+ 9.80
West Virginia	4	9,026,000	7,162,000	5,910,000	+21.18	101,396,000	85,746,000	+18.25
Wisconsin	2	26,000,000	19,136,000	16,738,000	+14.33	313,586,000	268,682,000	+16.71
Wyoming	3	2,070,000	1,738,000	1,421,000	+22.31	26,202,000	23,179,000	+13.04
Total		527,473,000	467,016,000	420,354,000	+11.10	6,092,132,000	5,468,212,000	+11.41
Daily Average		17,582,000	15,065,000	13,560,000	+11.10	16,691,000	14,981,000	+11.41
Increase over previous year:								
Amount		.....	46,662,000	.....		623,920,000	.....	
Percentage		.....	11.1%	.....		11.4%	.....	
Illinois	2	59,805,000	55,184,000	.....		.....	.....	
New Jersey	2	31,752,000	30,165,000	.....		.....	.....	
Colorado	3	10,352,000	.....	.....		.....	.....	
Connecticut	2	13,350,000	.....	.....		.....	.....	
Maryland	4	10,916,000	.....	.....		.....	.....	

		Quarter Ended Sept. 30, 1927	Quarter Ended Dec. 31, 1927	Quarter Ended Dec. 31, 1926		12 Months Ended With Dec. 31, 1927	12 Months Ended With Dec. 31, 1926	
California	3	273,754,000	254,778,000	233,078,000	+ 9.31	1,017,681,000	905,888,000	+12.34
Montana	3	18,153,000	18,079,000	11,524,000	+56.88	54,146,000	48,612,000	+11.38
Pennsylvania	3	204,325,000	174,687,000	140,802,000	+24.06	684,097,000	588,379,000	+16.27
(a) Tennessee	3	43,996,000	39,429,000	32,951,000	+19.66	148,952,000	129,129,000	+15.35

(a) Revised.



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Expansion Chamber Built on Lease Strips Gas of Crude Content

By Paul Wagner
N. P. N. STAFF WRITER

AN INGENIOUS hook-up that effectively serves its needs has been installed by the Texas Production Co., Rocky Mountain arm of The Texas Co., at its No. 1 Rhodes discovery well in 22-26S-37E, southeastern Lea county, New Mexico.

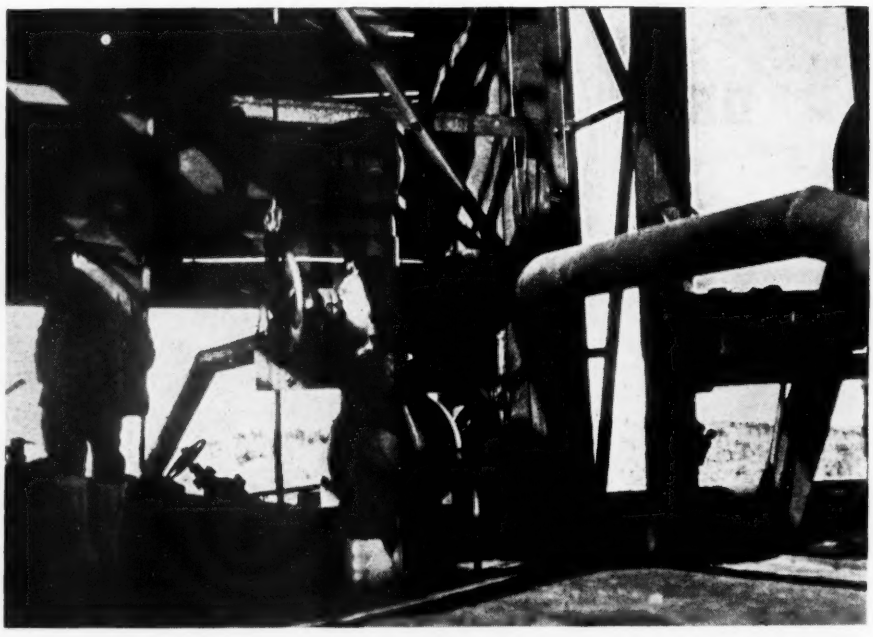
The company has been averaging production of about 110 barrels of oil and condensate daily through the gas separator and the "dripper" contrivance herewith pictured, together with approximately 22,000,000 cubic feet of gas daily.

A crude skimming operation is permitted by the "dripper" contrivance, thereby providing a supply of dry gas for boiler and camp purposes. In addition to supplying its own needs, the Texas Production Co. is selling gas from the Rhodes well to the Marland Oil Co. of Colorado for the drilling of its No. 1 Eaves test, two miles west in 19-26S-37E.

The control head at the Rhodes well is equipped with two 6-inch flow lines, one leading to the gas separator and the other to the "dripper" contrivance. A cut-off valve has been installed in each lead-off.

In using the flow line at the right, the gas and oil are separated in the usual manner. The oil then goes to a flow tank through a 2-inch pipe and the gas reaches an outlet vent for burning through a 4-inch pipe.

By closing the flow line at the right and opening a similar outlet on the left the production of the well (both oil and gas) is conducted about 100 feet to an expansion chamber. This contrivance, which is attached directly to the 6-inch flow line, was made by welding two reduction nipples, one at each end, to a joint of 8-inch casing.



B—Well head connection at Texas Production Co.'s Rhodes well, Lea county, New Mexico, showing 6-inch lead-offs from Christmas tree

The reduction nipple is fastened directly to the flow line at the end nearer the well; at the other end it is fastened to a 2-inch line, which branches into a pair of 2-inch lines leading away to gas consuming facilities.

On the bottom of the expansion chamber, which is slanted away from the flow line connection at an angle of about 10 degrees, are fitted six short lengths of 4-inch pipe. These are about three feet apart and installed at right angles to the expansion chamber. The lower ends of these short lengths of pipe are in turn connected by, and welded to, another piece of 4-inch pipe which serves as an oil collecting and condensing chamber. It discharges at its lower end through a reduction nipple into a 2-inch pipe which leads directly to the flow tank.

A—"Dripper" contrivance for stripping gas at Texas Production Co.'s Rhodes well, Lea county, New Mexico, for its crude, naphtha and gasoline content

THE expansion of the gas as it hits the 8-inch chamber induces quick lowering of temperature and a consequent precipitation of increasingly higher gravity fractions as the flow progresses up the incline. The fluid crude, naphtha and gasoline are then bled off from the drip and transferred to the lease tankage.

Gas handled through consumption lines for camp purposes or drilling fuel supply is thus freed of its load of fluid, and less volatile fractions, which might prove unsafe without "stripping."

As the area surrounding the Rhodes well is an isolated region, mile on mile from railroads in any direction, provision of a fuel supply is doubly important.

Pipe Still-Tower Design Can be Fitted To Many Purposes in Refinery

By H. S. Bell*

Presented at Petroleum Division, A. I. M. E. Meeting, New York, Feb. 20-23

IT SEEMS unnecessary to dwell upon the advantages of the modern pipe still as compared with the older type of distillation equipment used by oil refiners. The relatively low installation cost, coupled with remarkable operating efficiencies of pipe stills, precludes the consideration of other types except in rare instances where some peculiarity of product or plant may have an influence.

The question of the actual heat required to distill petroleum is quite involved. We have extensive data on the latent heats of the various hydrocarbons under different conditions of pressure. We also have information regarding the specific heats of various oils and the effect of temperature thereon. Because of the complexity of petroleum and of each fraction, it seems impossible to theoretically analyze the partial-pressure effect of the great number of hydrocarbons upon one another during distillation.

If a distillation curve and percentage analysis of any crude or product are available, it is possible to construct a curve with ordinates representing per cent distilled and B.t.u. per pound or per gallon, or other desired unit. To do so the crude is split into fractions, of 5 or 10 per cent. The boiling point and gravity of each fraction being determined, it is possible to evaluate the heat required. As each fraction is removed, the residue must be raised to a higher temperature and latent heat supplied for the successive fraction. As the calculations progress, the latent heats decrease while the specific heats increase. Such a curve is illustrated by Fig. 1 for a typical 39.9 B° north Texas crude.

The chart is illustrative of batch distillation. Theoretically, if the oil were heated by a single flash in a pipe still, the partial-pressure effect of the light products would result in the removal of the same amount of vapors at a lower temperature. Practically, we find that because of the necessarily extensive fractionating equipment required when separating many products all in vapor phase, the oil has to enter the separator at temperatures corresponding to or even above those required in the batch still. Furthermore, in single-flash distillation the vapors evolved in the heater must be superheated to the

What Can be Done in Pipe Stills?

IN THE accompanying paper has been made one of the most comprehensive studies we have ever seen of the various modifications that can be worked out in the design of pipe still and fractionating tower layouts to carry out various specific jobs in the refinery. The paper indicates that most refiners have not realized the full possibilities of this type of distillation equipment despite the great amount of literature available on the subject and the success that has been met with by pipe stills in many refineries.

Mr. Bell has had a wide experience in the design and construction of pipe stills, having been in charge of the installation of some of the equipment described in this paper. Every refiner will read with interest what Mr. Bell has to say in this paper. It should be noted particularly the wide variety of crudes upon which installations described herewith are working.

*Petroleum Engineer, New York.

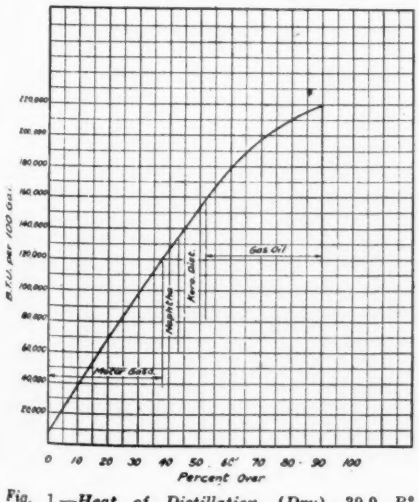


Fig. 1.—Heat of Distillation (Dry) 39.9 B° North Texas Crude

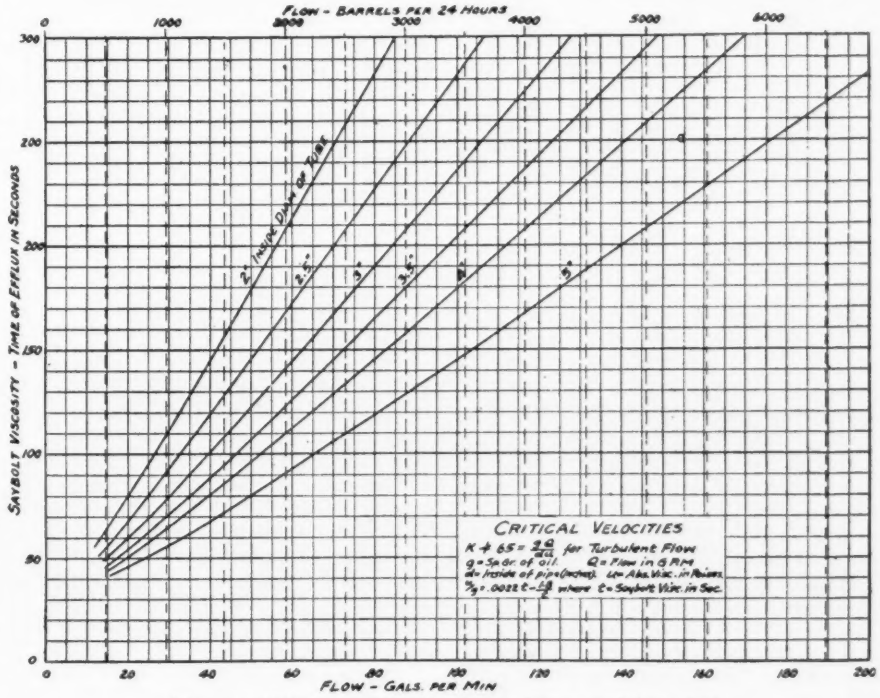


Fig. 2.—Minimum quantity of oil to insure turbulent flow

outlet temperature. Very little is known concerning the specific heat of the vapors, and the theory is complicated by the constantly changing pressure in the heater. In the calculation of the heat input, it is believed that this method (illustrated by Fig. 1) is sufficiently accurate until further data from research are available.

The efficiency of heat transfer is dependent on the velocities of the two exchanging mediums. Oil is a relatively poor conductor of heat and convection currents in large bodies of oil are very sluggish. Consequently, we find that in the case of shell stills, oil will not absorb more than 3 to 4 B.t.u. per square foot per hour per degree difference between flue gas and liquid unless some means of forced circulation is employed. If more heat is supplied to the plate than the oil can absorb, scorching of the oil and burned still bottoms result. Analysis of the heat input into oil passing through tubes at high velocity shows that 12 to 14 B.t.u. per hour can be safely transferred for each square foot per degree temperature difference.

For efficient transfer of heat we must have counterflow of the exchanging mediums. This cannot be accomplished in batch stills but is a feature of the well-designed pipe heater.

To avoid hot spots on a conventional still-bottom furnace, temperatures are rarely allowed to exceed 1600 to 1800 degrees. The usual practice has been to dilute the furnace gases with excess air at sacrifice of furnace efficiencies. Higher furnace temperatures are possible in pipe stills. The velocity and intimate contact of the hot flue gases are essential to input of heat to the steel surface, and here again, the tube-still lends itself to efficient design.

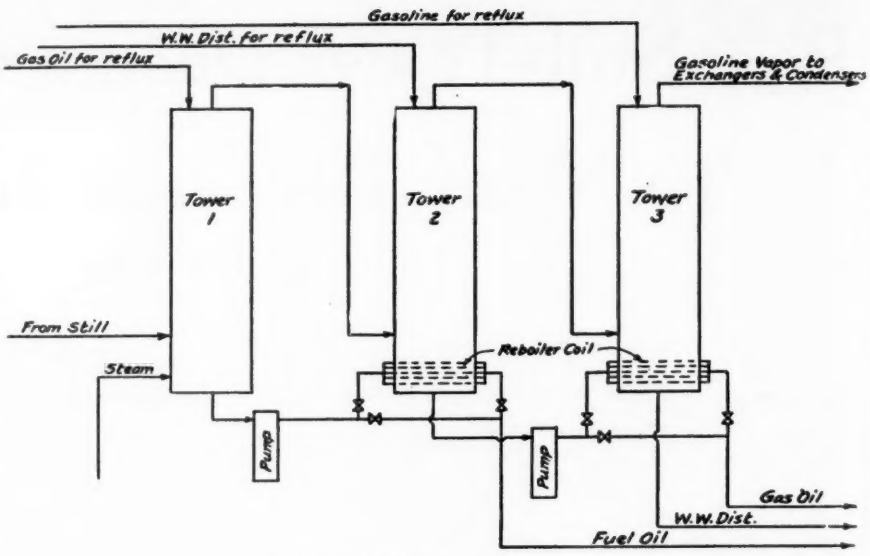


Fig. 3.—Multiple-towers 4-products

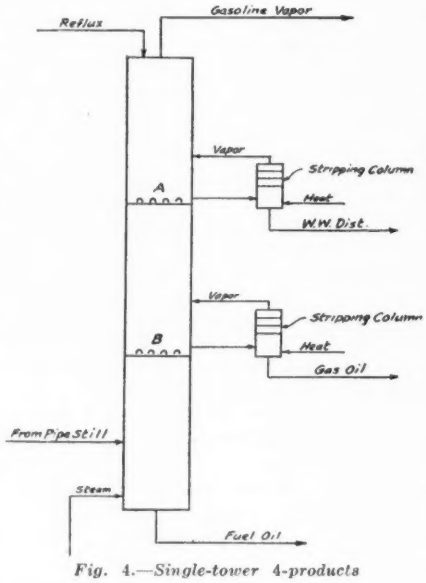


Fig. 4.—Single-tower 4-products

Two Phenomena of Fluid Flow in Pipes

WE ARE familiar with the two phenomena of fluid flow in pipes. First, streamline flow, where the fluid may be considered as a number of concentric cylinders each sliding past its neighbors; that next to the wall of the conduit has the slowest motion; the center one has the fastest. As increments of pressure are applied, the velocities are increased until a point is reached where further increments of pressure produce no increase of velocity. With further increases of pressure, a second point is reached when a further increment again raises the velocity. The fluid has now reached the second phenomenon of flow, called "turbulent."

Obviously, under the first conditions the outer cylinders of the fluid passing through a heater are raised in temperature above the average of the fluid, and local overheating is probable. When the flow is turbulent, the fluid is rolling and eddying through the pipe and conveys heat from the wall to the body of the oil so that local overheating is avoided. Designers, therefore, endeavor to maintain turbulent flow throughout the coil.

The turbulence factor may be expressed by the formula.

$$K = \frac{gQ}{du}$$

g = specific gravity
Q = gallons per minute
d = pipe diameter (inches)
u = absolute viscosity.

If K exceeds a value of 65, the flow is turbulent. Viscosity decreases as the temperature rises; a decrease in viscosity increases the turbulence factor, so, obviously, if the oil in a pipe heater is in turbulent flow at the inlet, turbulence is assured all of the way through. Fig. 2 shows the minimum quantity of oil of different viscosities flowing through tubes of various diameters that will insure turbulent flow.

Assume a capacity of 2500 barrels per day for a still of 4-inch outside diameter tubes, with an inlet temperature of 275 degrees Fahr.; at which temperature the oil has a viscosity of 40 sec. Saybolt. The flow at the inlet is turbulent. If 50 per cent is to be vaporized, the outlet velocity will be in the neighborhood of 250 feet per second, or nearly 3 miles per minute. With further vaporization, even higher velocities are met.

Pressure Drop Through a Pipe Heater

ON ACCOUNT of constantly changing temperatures, viscosities and gas volumes, it is impossible to theoretically predetermine the pressure drop through a pipe heater. The best forecast is empirical, based upon tests of similar heaters in service.

From the outlet of the pipe heater, the mixed oil and vapors are introduced to an evaporating chamber. Here we find a great many different types in service. Some are horizontal with longitudinal splash plates, some vertical with conical baffles. Others introduce the oil at a tangent in a vertical separator. Sometimes the stream is led directly into the fractionating column. All designs have some peculiar merit and meet to a greater or lesser degree the purpose. The evaporator should spread the oil out in a film to allow plenty of disengaging surface and be of a size to give sufficient time for separation.

Whether the evaporator is part of the column or is separate, we have at its outlet the same conditions; namely, a large volume of vapor composed of all of the overhead products. Upon their efficient separation into close commercial cuts depends the success of the distillation unit as a whole.

The bubble cap tower has superseded all other types for this service in connection with modern pipe stills. Here again we find a wide variation in design. In principle, the bubble tower may be likened to a series of

small superimposed stills. Each plate receives heat from the ascending vapors. Through the intimate contact of vapors with the liquid on the plate, there is an interchange of heat and the heavy ends of the vapors are condensed into the liquid, while the light ends of the liquid are evaporated and ascend with the vapors to the tray above.

Some Principles of Bubble Tower Practice

BOOKS have been written upon the subject of fractionation in bubble towers. It is beyond the scope of this paper to go into the theory in detail, but a few principles and conclusions should be kept in mind.

If there is no heat loss, and in a well insulated column this loss is negligible, the liquid descending through the tower is supplied by returning a portion of the condensed vapors leaving at the top. If a column is supplied with a certain amount of heat at the base measured above a certain temperature, and there is no loss of heat, the sum of the heat in all streams leaving the tower will have to add up to the heat input. In the tower there is necessarily a drop in temperature as various fractions are condensed out. This sensible heat and the latent heats are abstracted by evaporation of the reflux fed into the top of the tower.

If perfect mixing were possible on each plate, the vapors ascending into the plate would be completely condensed into the liquid on the plate. This heat of condensation would evolve a new vapor, which would ascend to the plate above. Such a plate is termed the "ideal section" and is the basis of the theory of bubble columns.

The minimum amount of reflux for any given separation is attained only by an infinite number of ideal sections. This minimum reflux is a function of the concentration of light ends desired in the final product and the composition of the feed to the columns. Since we can build neither an ideal plate nor a column with an infinite number of plates, some balance must be established between the amount of reflux and the number of plates. The lower the reflux ratio, the less heat will be required to effect the separation, but more plates must be used. If fuel is expensive, the column should have more plates and less reflux than would be the case with cheap fuel.

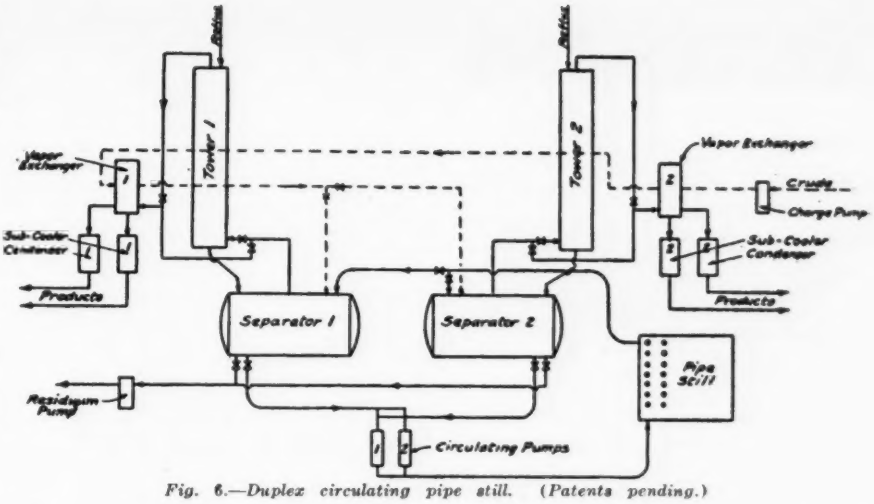


Fig. 6.—Duplex circulating pipe still. (Patents pending.)

Since no plate is 100 per cent efficient, it follows that the liquid on any tray is never completely stripped of the light boiling fractions found on the tray above. By means of multiple trays it is possible to make a commercial separation of a light product and a residue. If absolute separation of light products from residue is desired, it is necessary to redistill the residue. This may be done by the use of a separate column or stripping section, but in any case is dependent on the introduction of more heat. These facts illustrate the fallacy of attempting to bleed finished products directly from the tower. The means to effect the separation will be discussed later.

IT IS unnecessary to go into the theory of heat exchangers and condensers—both are important adjuncts of pipe-still units—but it is in order to discuss the preceding general theory as applied to the integral parts of a pipe still.

With reference to the furnace proper, it was stated that the pipe still is admirably adapted to counter-flow of oil and flue gases. Therefore it is generally possible to bring the exit-gas temperatures down to as low a figure as will provide sufficient draft. With the usual heat-exchanging systems, inlet temperatures of 300 to 350 degrees are encountered. Occasionally, more extensive application of heat exchange is made and temperatures up to 500 degrees are on record. It should be pointed out that inlet temperatures around this figure begin to affect the furnace efficiency adversely. Since the overall efficiency is the more important, a proper balance should be struck.

CORRECT furnace design is of prime importance to successful pipe-still operation. A surface will absorb heat from a radiating surface at about 10 times the rate of the absorption of heat by convection. Therefore the part of the pipe still doing the most work per square foot of surface is that exposed to direct radiation. The design of this section must carefully analyze the oil temperature and velocity to be sure that it will be able to absorb this heat. Otherwise, carbonization and burned tubes are inevitable.

It has been found that radiant heat and flame impingement on the same surface create a serious condition. By elimination of the flame impingement, higher furnace temperatures may be carried. The radiant tunnel construction is a development along this line.

Another line of approach toward the elimination of overheating is to keep furnace temperatures at a lower degree. The admission of excess air to accomplish this purpose is wasteful from all standpoints, but is the method still used in many plants. Recirculation of the flue gases will attain the results desired and at the same time maintain a high efficiency.

The mechanical side of furnace design is also important. The settings of a great many pipe stills are badly cracked by expansion strains. Air infiltration and consequent decrease of efficiency result. The suspension of the tubes by a structure independent

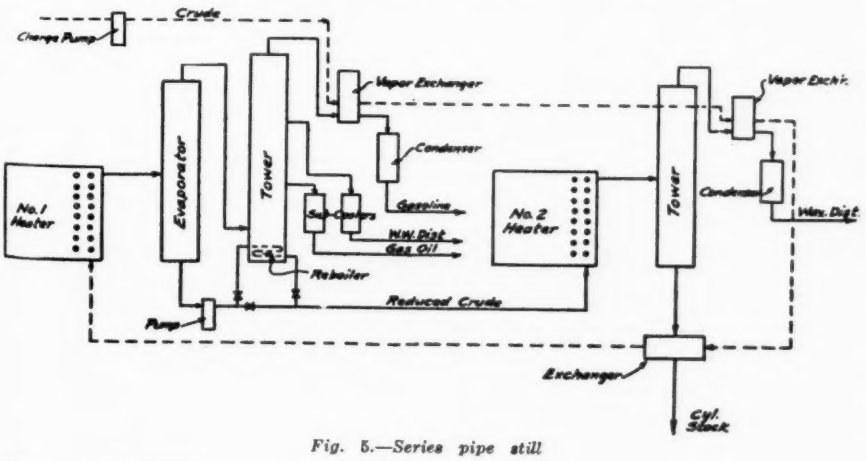


Fig. 5.—Series pipe still

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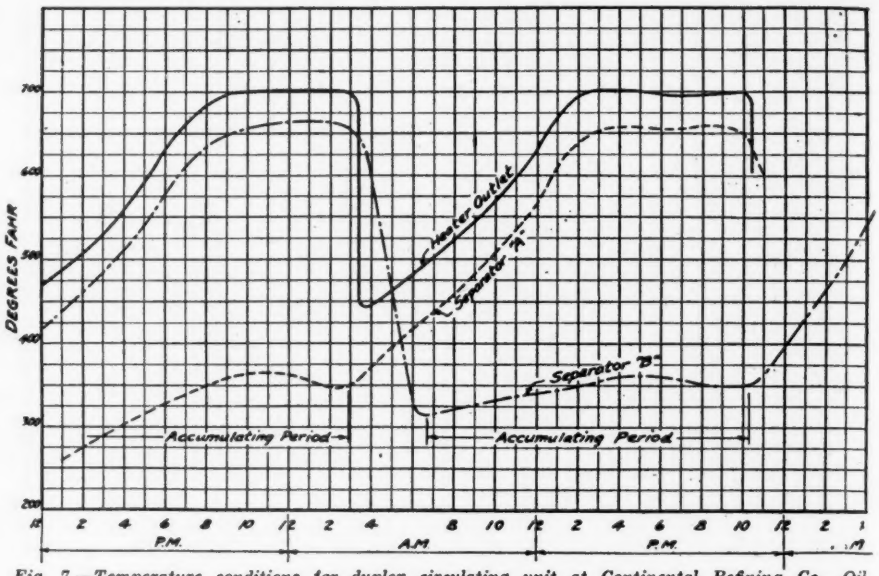


Fig. 7.—Temperature conditions for duplex circulating unit at Continental Refining Co., Oil City, Pa. Results of Aug. 13-14, 1927

of the furnace brickwork will eliminate much of this trouble.

Too Small Tubes Likely to Cause Trouble

IN THE theoretical discussion of the flow of the oil through the tubes of a pipe still, it was pointed out that if the oil was above the critical velocity at the inlet there was no danger of streamline flow further on. In the early days of pipe-still design, some units were built with tubes of 2-inch diameter, and even smaller, with the idea of maintaining high velocities, but with such tubes trouble will ensue if the charging pump stops. Therefore, the practical consideration of ease of cleaning must be balanced against the desirable tube velocities. A small tube in a furnace of normal width at the usual temperatures will tend to bow and warp, thus adding to the inherent difficulty of cleaning the small bore. Therefore, we rarely find tubes of smaller diameter than 3 inches. The usual sizes are 3 and 4 inches and if the use of such sizes results in too much pressure drop, it is considered good practice to use two or more tubes in parallel.

Bubble towers are available in a multitude of designs. Provided the number of caps and plates is sufficient for the separation desired, good results may be anticipated. The question of control is important. The inlet temperature at the base is capable of control by the heater. The top temperature will depend on the amount of reflux. Two general methods are used to furnish this reflux; first, using partial condensers; and second, pumping back a portion of the finished top product.

The results by both methods are the same, and the selection depends on practical considerations. If partial condensers are used, they must be placed so that the condensed product used for reflux will drain back to the tower. It is customary to use oil for cooling, thus making the partial condenser part of the exchanging system. The worst conditions, as far as corrosion is concerned, are usually found at the condensing point of products ranging from 180 to 250 degrees Fahr. This is just about the condition under which a partial condenser will operate so that relatively high maintenance may be expected.

On account of the added cost of steel structures to support the partial condensers, the difficulty and expense of repairs so high above ground and the disruption of operating conditions in the tower when such apparatus is out of commission, we find the trend away from such methods of control and towards the pump-in method.

Using a pump, the partial condenser becomes only a heat exchanger and may be set low. If the condenser is proportioned for emergency operation, the exchanger may fail and the tower will still function at the cost, of course, of some extra fuel.

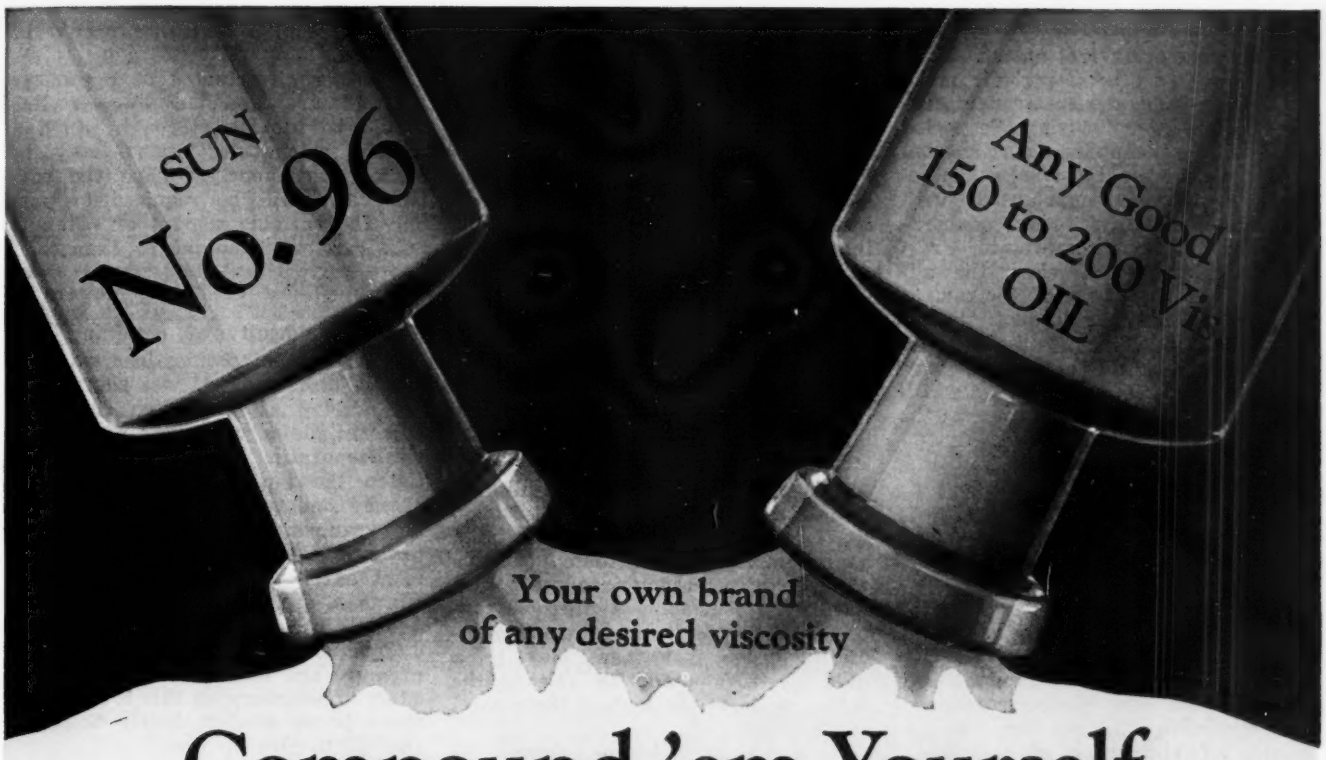
Electric and air-actuated controllers are in use with both systems to control the top temperature.

The ideal tower control is one that gives a balanced condition of the reflux so that the tower temperature is held constant. With this condition, the result will be—theoretically at least—a maximum yield with the smallest amount of fuel for any particular installation.

Pyrometers and Air Actuated Controls

THE problem, then, is to obtain a control instrument that will give this balanced condition. The sensitivity of the control mechanism will determine to a large extent whether or not the desired end points are obtained. There are two general classes of instruments which are being used satisfactorily: (1) pyrometer controls and (2) air-actuated controls.

Undoubtedly a pyrometer is more



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sensitive than any other type of temperature-measuring instrument. However, there must be a periodic make and break in a pyrometer temperature controller, and during the period that the thermocouple is disconnected from the motor-operated valve the reflux may become unbalanced, with the result that the tower temperature will not remain constant. From a practical point of view, the advantages of this type of instrument are that it may be located at any desired point without affecting its sensitivity, and the control may be set at the exact temperature at which the operator desires to control the tower.

The air-actuated controls fall into three classes, depending on the type of filling of the capillary tubes, each of which has its advantages and disadvantages. These three classes are: mercury-filled, vapor-tension and gas-filled instruments. As a class, the advantage is that as soon as the temperature is transmitted to the regulator, the reflux is brought into balance with the tower conditions. The controlling factors are the sensitivity of each type of instrument from a theoretical point of view, and the location of the instrument from a practical point of view.

IT IS claimed that the mercury-filled instrument is the most sensitive as well as the most rugged type. It requires short tubing lengths and therefore has the disadvantage of having to be located near the point of control.

The vapor-tension instrument is claimed to be as sensitive as the mercury-filled instrument, over a comparatively small range. The disadvantage is that it is necessarily limited to a smaller range of settings than the mercury-filled instrument; however, the length of tubing may be longer, so that the location of the instrument may be more variable than that of the mercury-filled controller.

The gas-filled instrument, according to instrument manufacturers, is not as sensitive as the mercury-filled or the vapor-tension instrument. It does, however, lend itself to greater flexibility from a practical standpoint, in that it may have as long a capillary tubing as the vapor-tension instrument and may be of the direct-set type operating equally well over a wide range of temperature settings.

When the tower temperature is to be regulated by air-actuated controls while pumping reflux into the tower, it is well to combine a pressure regulator with the temperature regulator in order that there may be a fluid pressure ready to release the reflux liquid at the instant the control valve opens.

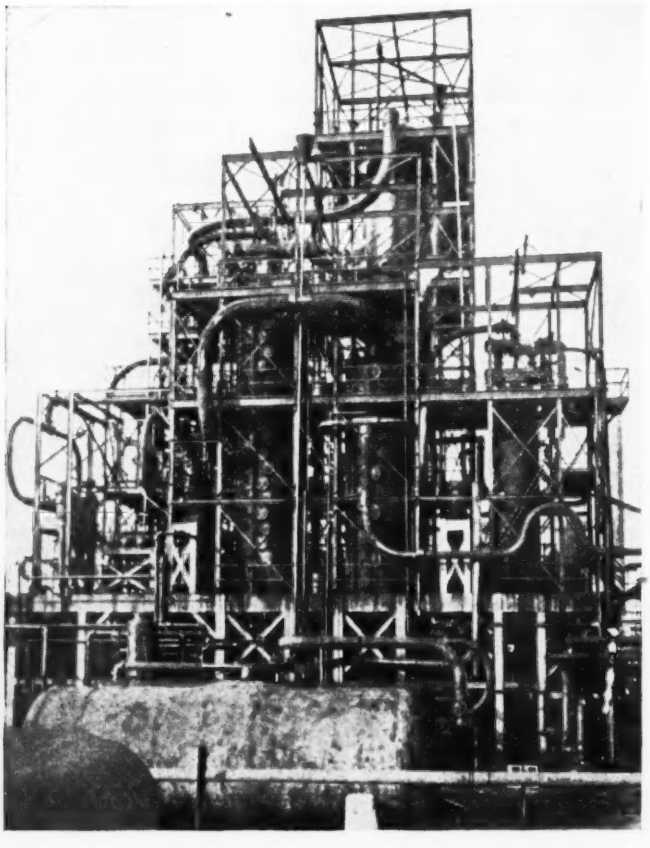
Although straight-line control is theoretically the most satisfactory, a variation of ±2.5° F. is well within reason for all practical purposes and may be accomplished with either pyrometer or air-actuated controls. The type of instrument to be installed can be determined only for the particular job under consideration; for example, if remote control is desired, the pyrometer controller is the most satisfactory; if simplicity of equipment is the outstanding need, the air-actuated controller should be installed.

Whether air-actuated or pyrometer controls are used, a by-pass line should be provided through which a certain amount of reflux may be passed continuously. Thus the control valve will be required to pass only the variable amount of reflux to take care of temperature changes.

Flow Sheet of Bubble Towers

THE difficulty of obtaining side streams to specifications was previously discussed. It was shown that the overlap of distillation curves of adjacent plates was excessive. Effective separation is possible only between the top and bottom products of any one tower. This is in effect an argument in favor of multiple towers. Consider such an arrangement as shown by Fig. 3. Tower 1 effects a separation between fuel oil and all other products. The introduction of steam to lower the vapor pressure and hence create a reboiling effect is necessary on this tower, since there is no product hotter than the fuel oil to give up heat.

Gas oil, kerosene and gasoline vapors enter tower No. 2. Here only the gas oil is removed, the other two passing as vapor to tower No. 3 where final separation between kerosene and gasoline is made. In towers 2 and 3 there is available material at a higher temperature, the heat of which may be utilized for reboiling the material removed as liquid from the bottoms. The number of plates, tower diameter, etc., may be



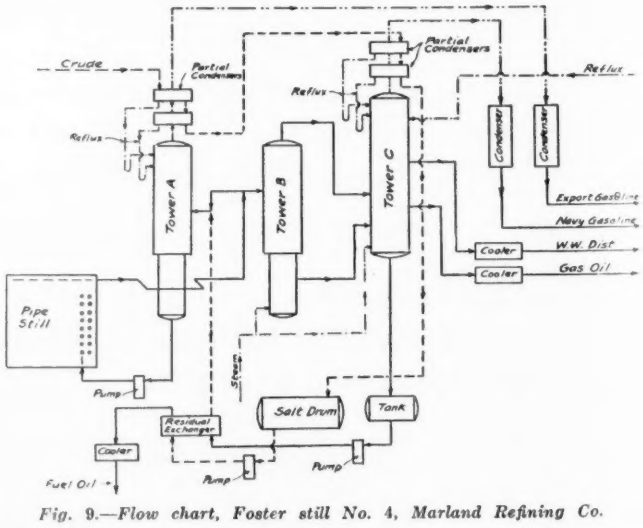


Fig. 9.—Flow chart, Foster still No. 4, Marland Refining Co.

FIG. 8.—FOSTER STILL

This gives arrangement of the three Badger towers. The small one on the right is A tower, where the first flash is made. The middle is B tower, where the second flash is made, and the one on the extreme left is the C, or bubble tower. The large tower back of B is the Power Specialty tower on No. 5 Foster still. All pumps and residuum exchangers are on the ground under the towers

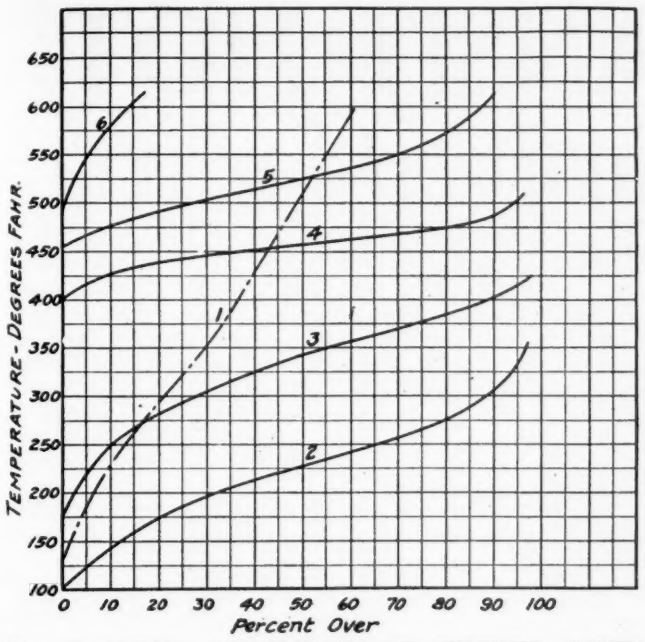


FIG. 10.—ENGLER DISTILLATIONS OF PRODUCTS, FOSTER STILL NO. 4, MARLAND REFINING CO.

1, crude, 39.9 B°; 2, overhead, tower A, export 64.5 B°; 3, overhead, tower C, Navy 53.5 B° 4, kerosene distillate 41 B°; 5, gas oil, 36.7 B°; 6, residuum, 25.4 B°

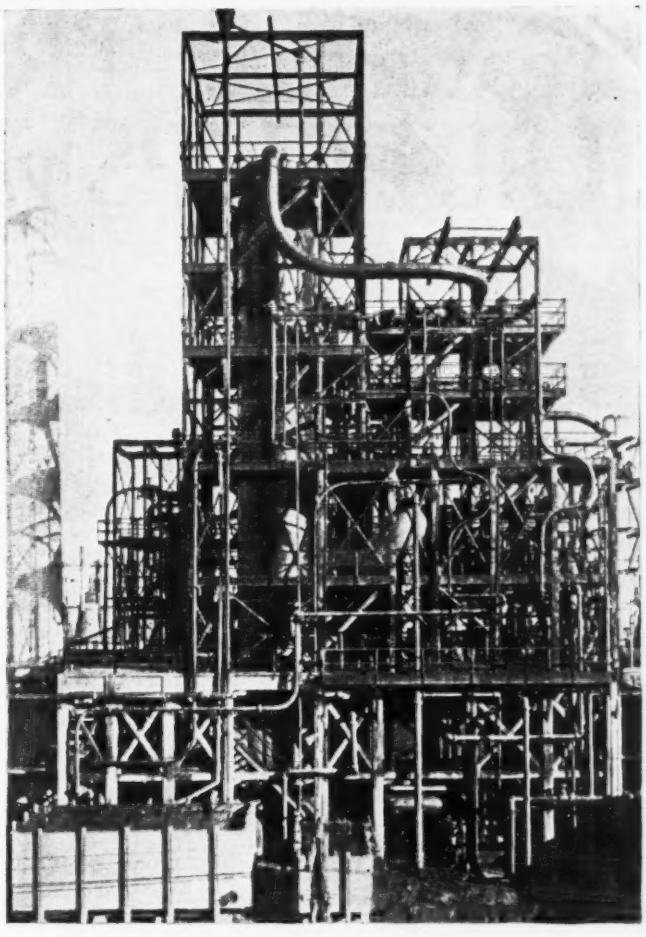


FIG. 11.—FOSTER STILL

Shows the single large Power specialty tower on No. 5 unit. Ground level has all pumps. First deck carries residuum and gas-oil exchangers and coolers. Second and third decks support gasoline and kerosene water-coolers. Fourth and fifth decks carry the vapor to crude exchangers and condensers

varied to meet conditions.

Now consider that one column will take the place of all three; assuming, of course, that the total number of plates will remain the same. (Refer to Fig. 4.) The overhead vapor cut will correspond to that from tower 3 of Fig. 3. At some plate *A* there will be a liquid whose highest boiling point will correspond to that desired for the end point of the kerosene. It will, however, contain light ends belonging to the gasoline series. Therefore it must be redistilled in a separate column with the application of heat from some source. The same is true of the gas-oil fraction. It would be equally possible to take liquid from a plate lower than *A* whose initial boiling point is at the end point of gasoline. This stream could be led to a side column and refractionated, so that the vapors evolved would form the kerosene cut, which would be led away and be condensed while the bottoms would reflux back to the main column.

IT IS unnecessary that these small auxiliary columns should be outside the main tower. Their function is accomplished by the various proprietary so-called "stripping" sections located sometimes within the tower itself. The efficiency of the tower, as far as absolute separation of products is concerned, is, however, dependent on the care and judgment used in the design of these sections.

Consider further the fact that the greater the difference in boiling points between two products, the easier is the separation in any given tower. For instance, the mean boiling point of gasoline, say, is 275 degrees, and of kerosene 490 degrees, a difference of 215 degrees. This separation is easier of accomplishment than that of kerosene from gas oil, with a mean boiling point around 600 degrees, and the difference only 110 degrees. Likewise, the clean separation of gas oil from fuel oil is harder because the boiling points of these two products are still closer together. Therefore, as a general statement, the further we go into the crude the more difficult is the separation of successive cuts. Fortunately, very few refiners are interested in close cuts by boiling points after gasoline and kerosene are finely separated. The end point of kerosene is of little interest, if gravity and color are satisfactory. Of even less interest is the separation between gas oil and fuel oil.

When we come to the fractionation of the overhead products from a crude being run to cylinder stock, the separation of the heavy ends is of great importance. If any wax distillate or gas oil is left in the cylinder stock, the established flash, fire and viscosity relationships are altered, and the dewaxing problem is complicated. Likewise, the presence of cylinder stock in wax distillate is detrimental to wax removal by cold pressing. In the present state of the art, the more conservative method of effecting the final separation between wax distillate and stock is to remove only a portion of the distillate in the once-through pipe still and then use other apparatus. Batch stills or circulating pipe stills can be used. The series pipe still also appears to have possibilities.

Assembly Into Complete System

IN GENERAL, pipe stills may be divided into three distinct types: (1) the "once-through" or single-flash; (2) the series pipe still, where two or more are operated in series; (3) the circulating pipe still.

The first is the most popular and has the broadest field. With a properly designed single column or multiple towers, separations to meet specifications of all light products can be made with excellent yields and cost figures. For heavier products the separations are satisfactory as far as gas oil and fuel oil are concerned. It appears to have limitations when cylinder stock is the desired residual product.

The second type, in which two pipe stills are operated in series, presents two advantages. In this case, the volume of cuts removed in vapor phase is greater than in the case of the single-flash unit, therefore the possibilities of vapor heat exchange are greater. Secondly, if

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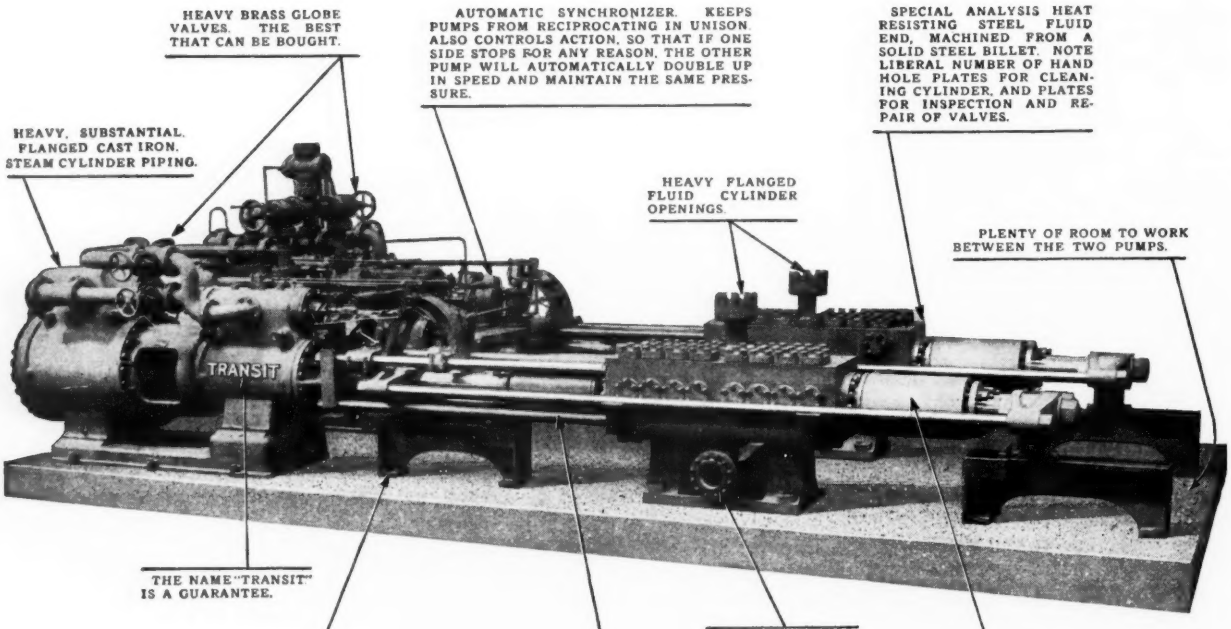
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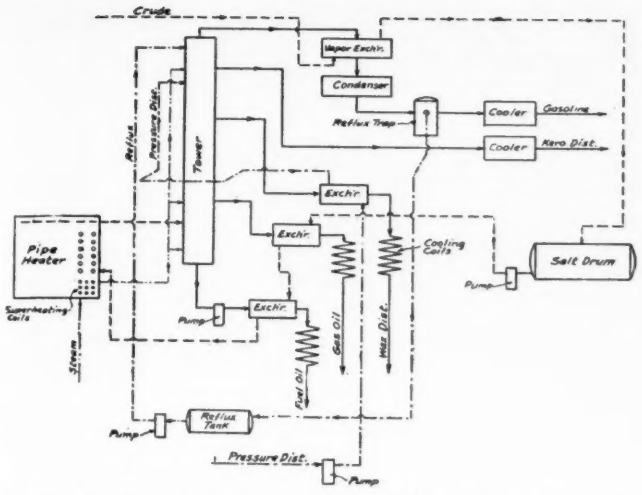


Fig. 12.—Flow chart, Foster still No. 5, Marland Refining Co.

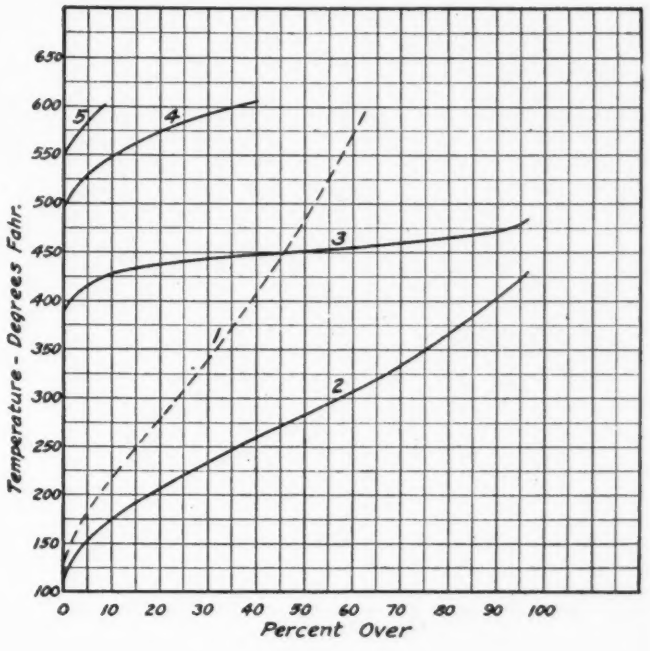


FIG. 13.—ENGLER DISTILLATIONS OF PRODUCTS, FOSTER STILL NO. 5, MARLAND REFINING CO.

1, crude 40.7 B°; 2, gasoline 58.2 B°; 3, kerosene distillate 41.5 B°; 4, gas oil, 35 B°; 5, residuum 24.5 B°.

close separation of residuum from the next heaviest product is desired, a second simple tower will give better results. It will only have to separate two products, and the problem is not complicated by the partial vapor pressures of all the superheated light vapors passing through the tower. Fig. 5 is diagrammatic of such an arrangement.

It is said that such an arrangement is expensive to construct. As a matter of fact, careful estimates show that the savings in heat-exchanging equipment and smaller-diameter towers about offset the cost of two furnaces. Criticism has also been made of the high flue-gas temperature at the outlet of the second unit. This hot flue gas may be passed to the first unit and used to dilute the products of combustion at that point. Little has been done on commercial installations of this type, but it is believed that there are inherent advantages which should receive more attention. Particularly is this true where close control of bottom products is desired.

THE circulating type of pipe still is in reality a batch still with an independent means of supplying the heat. While the addition of a circulating tube nest to a batch still will not in itself greatly improve the fuel efficiency of such a unit, it will eliminate the possibility of hot spots on the still bottom. As the oil increases in temperature, flue-gas temperatures must also rise, accounting for the poor efficiency as compared to the once-through or single-flash unit.

However, one advantage is inherent in any batch operation and that is close control of the residual product. To bring up the efficiency of the circulating type of still, the diagram (patents pending) of Fig. 6 is submitted. This is in effect two batch stills, separators 1 and 2, connected to one pipe heater. Consider No. 1 as operating on the heater. No. 2 may be used as an accumulator of heat by feeding the crude over the exchangers. By the time No. 1 is off, there is a batch of hot stripped crude in No. 2. The heater is then connected to No. 2 and No. 1 is pumped out to serve as the accumulator for the next batch. The flow of crude on the next cycle is not shown on the diagram but is reversed in direction and goes into No. 1. The temperatures through two cycles from actual operation are shown by Fig. 7.

From actual runs, the fuel required for such a unit has been demonstrated to be between 10.5 and 11 pounds of coal per barrel, or about 2.4 per cent oil equivalent when running Pennsylvania crude to cylinder stock. This compares quite well to the efficiency of single-flash units.

The principal advantages of the arrangement are close control of bottoms coupled with good fractionation and over-all fuel efficiency. Its disadvantages are a higher steam consumption and limitations as to size. The maximum for one unit is about 1500 barrels daily capacity.

Typical Examples and Results

FIG. 8 and Fig. 9 are a photograph and diagram respectively of No. 4 Foster still at the plant of the Marland Refining Co. It is

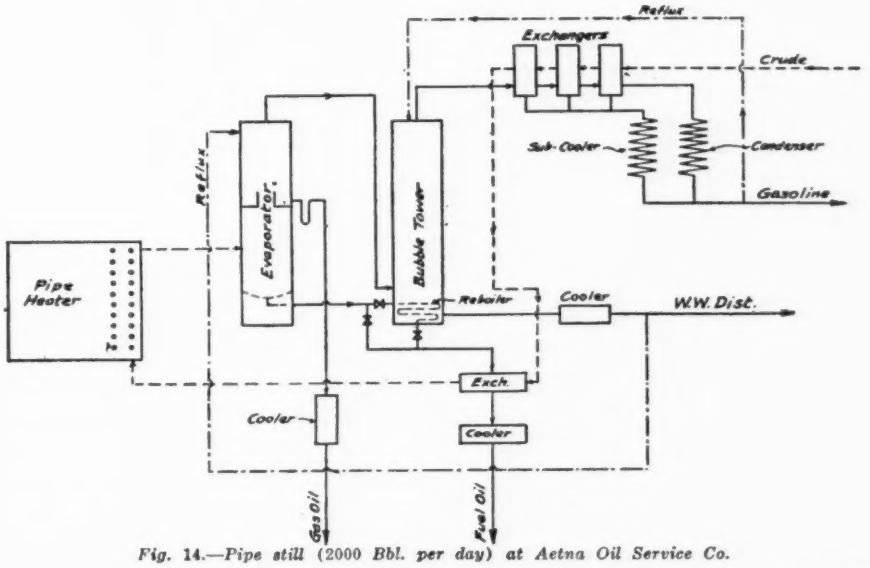


Fig. 14.—Pipe still (2000 Bbl. per day) at Aetna Oil Service Co.

of the single-flash multiple-tower type. The heater consists of a Power specialty furnace with an effective length of 3334 feet of 4-inch tube. Badger towers are used. The first, marked *A*, is a flash drum where the gasoline evolved in the exchangers is removed as an export cut having 350 to 400 end point. The temperature of the flash drum is determined by the amount of hot oil from the pipe still by-passed into the drum with the fresh crude. Tower *B* is an evaporator for the pipe still and *C* is the final fractionating column.

The crude circuit is first over the partial condensers, where it reaches a temperature of 220 degrees. It then goes to a salt drum, from which it passes over residual exchangers and is raised to 250 degrees before entering the flash tower *A*. Enough hot oil from the heater enters with the fresh crude to bring the temperature in the flash drum up to 370 degrees. The oil is then pumped from the flash drum *A* through the tubes of the still, is raised to 550 degrees and enters the evaporator.

The bottoms from tower *B* are pumped into a stripping section at the base of tower *C*, where they furnish heat for reboiling the bottoms from *C*. One top stream of gasoline and side streams of kerosene and gas oil are removed from *C*. This unit has a capacity of 7000 to 10,000 barrels per day. Fig. 10 shows the distillation curves of products. When removing 75 per cent of distillates from the crude, a fuel consumption of 1.4 per cent is reported.

Fig. 11 is a photograph and Fig. 12 is a diagram of Foster still No. 5 also at the plant of the Marland Refining Co. This is also a single-flash unit with the fractionation accomplished in a single column. The furnace and tower are both of Power Specialty Co.'s design. The furnace is the same as that just described. The tower is 10 feet 6 inches in diameter and 76 feet 6 inches high. This unit has a skimming capacity of 10,000 barrels daily. When running to 11 per cent cylinder stock bottoms, the capacity is reduced to 5000 barrels and is intermediate for other proportions of overhead. The fuel consumption is 1.5 per cent for 26.5 per cent bottoms, and 2.4 per cent for 11 per cent cylinder stock bottoms.

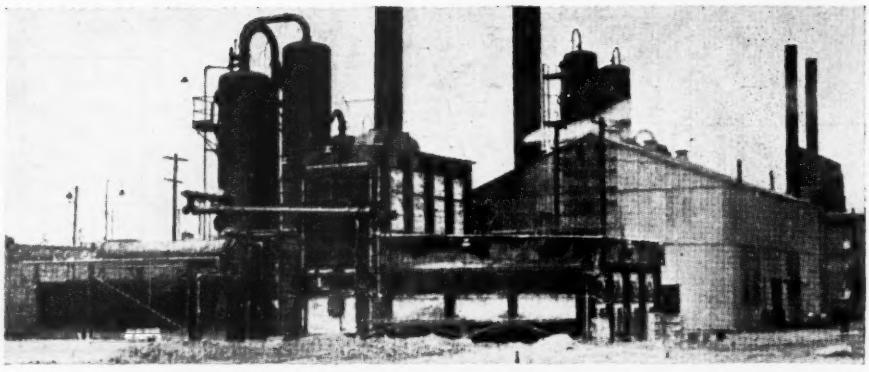


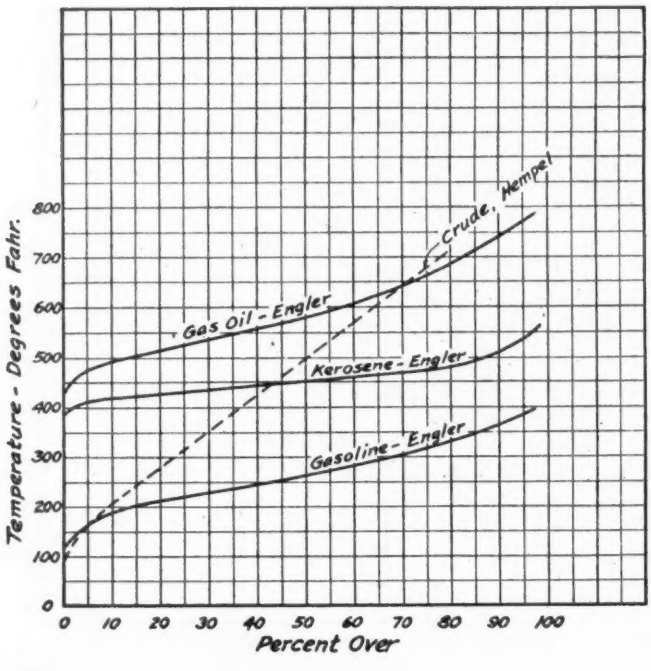
Fig. 16.—Radiant-heat pipe still (2500-Bbl.) Designed and built by M. W. Kellogg Co. for Simms Oil Co. at Smackover, Ark.

THIS tower is controlled entirely by the "pump in" system, no partial condensers being used. When skimming, both finished gasoline and pressure distillate are used for reflux. When running to stock, finished gasoline only is used with a reflux ratio (gasoline returned to the tower divided by final amount of gasoline taken from the system) of 3.5.

In this tower the stripping sections are integral and the reboiling effect is accomplished by the use of steam. Fig. 13 shows the distillation curves of the products.

A smaller unit with less refinement is shown by Fig. 14. This is installed at the plant of the Aetna Oil Service Co. at Louisville, Ky. It has a daily capacity of 2000 barrels. A Foster heater and towers of the writer's design are used. Results are shown by Fig. 15, which are the average for May, 1927. The fuel consumption over the same period, when running to 21 per cent bottoms, was 2.15 per cent and has been reduced somewhat since.

Fig. 16 is a photograph of a pipe still designed and built by the M. W. Kellogg Co. for the Simms Oil Co. at Smackover, Ark. The furnace is of the radiant-heat type, eight carborundum tunnels being used. The coil consists of 4-inch tubing with an effective surface of 6600 square feet. The unusually large amount of surface is accounted for by the purpose of the design, which called for the maximum gasoline yield from heavy Smackover crude, coupled with bottoms that could be sold as commercial fuel. By operating under some



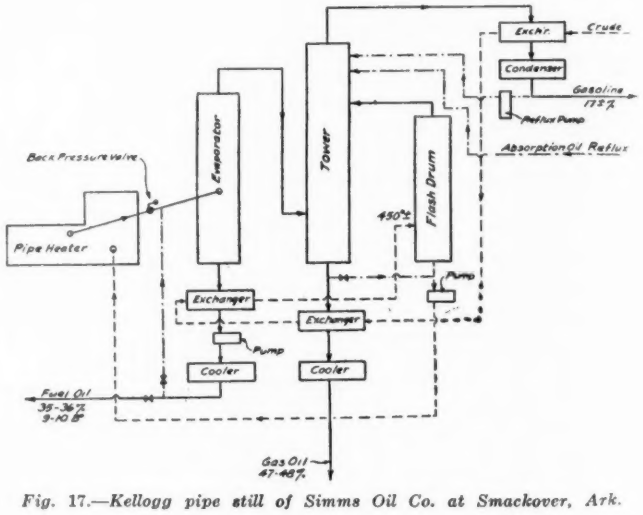


Fig. 17.—Kellogg pipe still of Simms Oil Co. at Smackover, Ark.

FIG. 15.—PIPE-STILL RESULTS FOR MAY, 1927, AETNA OIL SERVICE CO., LOUISVILLE, KY.

Yields: gasoline, 40.79 per cent.; kerosene, 6.77 per cent.; gas oil, 30.78 per cent.; 20/22 fuel oil, 21.03 per cent.; loss, 0.63 per cent

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back-pressure and utilizing some of the excess surface as a soaking section, the desired results are attained.

The unit has a daily capacity of 2500 barrels, removing 17 per cent of gasoline and 47 per cent of pressure-still charging stock.

Fig. 17 is a self-explanatory flow chart, the results being shown by Fig. 18.

An unusual pipe-still installation is shown diagrammatically by Fig. 19. This unit is one of two installed at the Petty's Island refinery of the Crew-Levick Co. In all other examples given, tower control is accomplished by either refluxing or pumping in a portion of the final overhead condensate. In this unit, the vapors of each tray are partially condensed and returned as reflux.

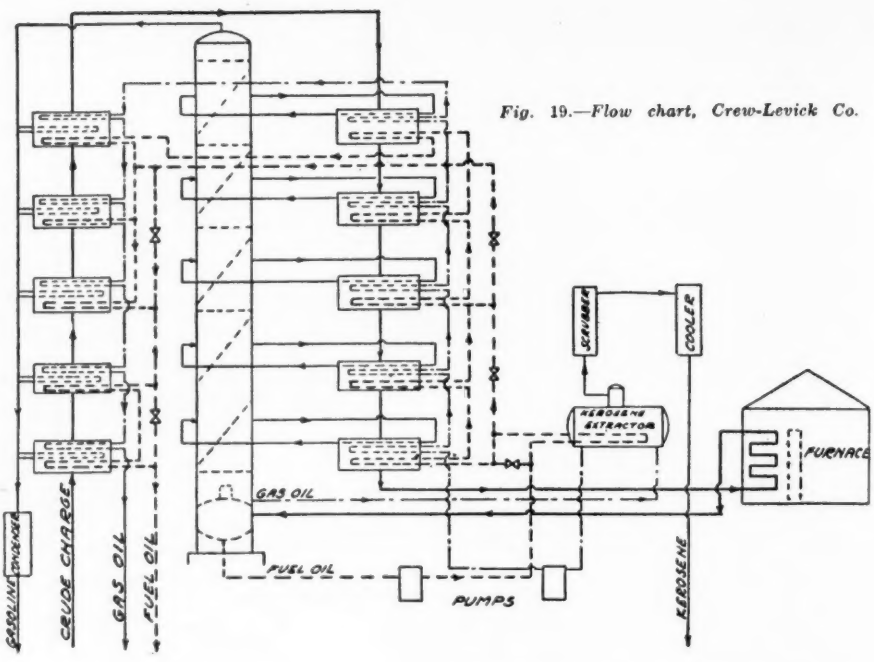

Fig. 19.—Flow chart, Crew-Levick Co.

There are six bubble trays and six interchangers, one for each tray. The crude going to the unit is in the body of the interchangers around the tubes. The additional four interchangers are used only as heat exchangers. There are three sets of tubes in each of the 10 interchangers. Vapor is in one, hot gas oil in the second and hot residuum in the third. The principle of the design is to maintain a low temperature differential between the vapors from any one tray and the crude in the interchanger of that tray. The temperature of the crude is controlled by by-passes around the interchangers in the hot fuel-oil circuit. Thus the amount of reflux bled back to the tower is determined. Once the temperatures are established, a balanced condition is reached which requires very little attention. No automatic controls are used.

Note that only one overhead cut is taken from the tower. The bottom product is water-white distillate and gas oil combined. This is led to an auxiliary vessel, termed extractor. By means of open steam coupled with heat from the fuel oil from the evaporator section, the kerosene is removed. The gas-oil bottoms then enter the exchanging system as described above.

As might be expected from such a complete exchanging system, the crude enters the pipe still at a very high temperature, 500 degrees to 510 degrees being the usual figures. The pipe heater itself is, therefore, relatively small. The fuel consumption is exceptionally good, 1.4 per cent being reported for an overhead of 60 per cent. The distillation curves of the products are shown by Fig. 20.

Acknowledgments

The author appreciates the co-operation of the Marland, Simms and Crew-Levick Oil companies, without whose permission much of the data herein given could not have been released.

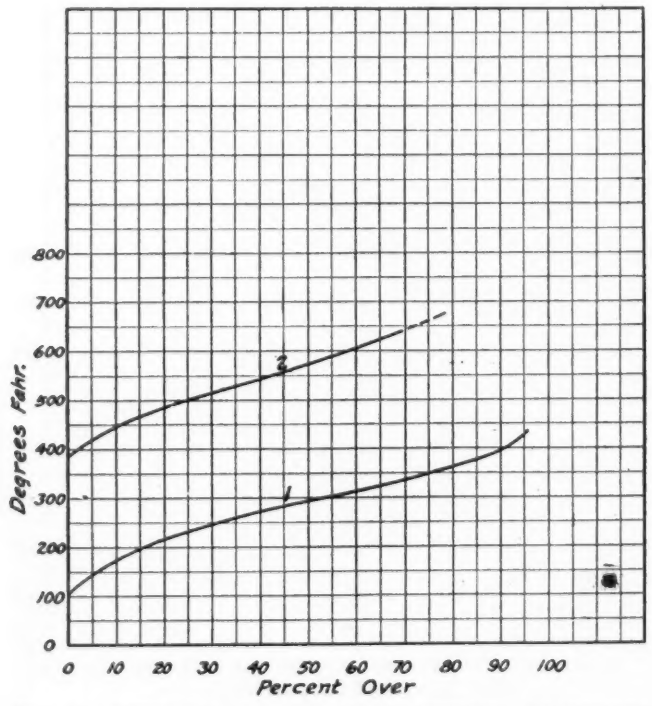

FIG. 18.—SIMMS OIL CO., PIPE-STILL RESULTS, SMACKOVER REFINERY

Crude 20.4 B° Smackover; 1, gasoline, 53 B°; 2, gas oil, 27 B°; bottoms, 9.8 B°, 585 furol at 122°

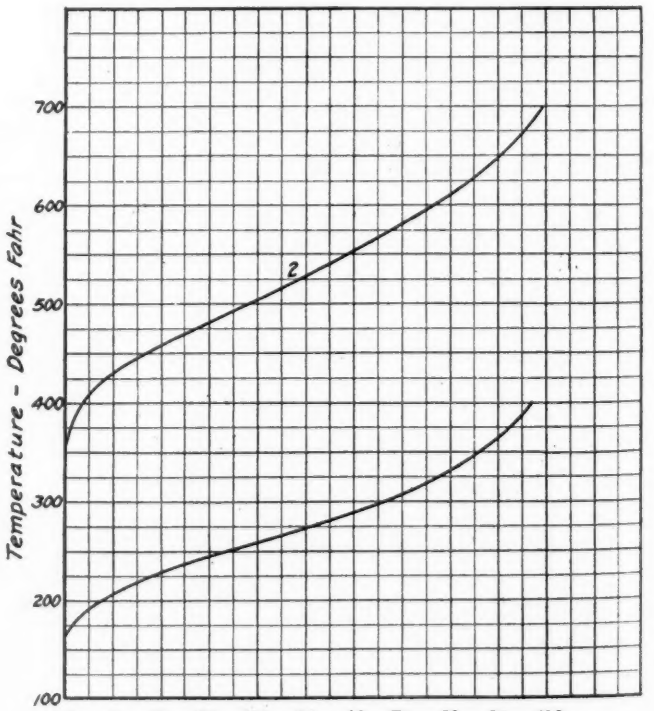

Fig. 20.—Engler distillations, Crew-Levick pipe still. 1, overhead gasoline; 2, tower bottoms (kerosene and gas oil).

Lack of Bottles Slows Specification Work

CLEVELAND Feb. 27.—Some delay was caused in the manufacture and distribution of the Babcock bottles for use in the unsaturates test, writes I. J. Fairchild, of the commercial standards unit of the Department of Commerce, regarding the delay in final agreement on specifications for Stoddard Solvent. The letter of Feb. 17 to producers and users of Stoddard Solvent says in part:

"A large number of check tests have been made by various methods on samples of Stoddard Solvent, supplied by the refiner manufacturers of the sub-committee.

"Considerable attention has been given to the acid heat test, which consists in measuring the rise in temperature produced when 30 ml of concentrated sulfuric acid is shaken with 150 ml of solvent under prescribed conditions.

"The results of these tests appear to be very encouraging to those participating, namely Dr. Lloyd Jackson, Mr. Eichlin, of the National Association of Dyers and Cleaners, and Dr. H. T. Kennedy, of the Bureau of Standards.

"Although no official report has been received from the committee, the above-named gentlemen consider that future work should be done to decide whether a new bottle, designed at the Bureau of Standards, or the acid heat test, should be adopted as a basis.

"It is hoped that final report of the committee will be received by March 15."

Clarke Transferred to Venezuela

TULSA, Feb. 24.—H. C. O. Clarke, who organized the production engineering department of the Pure Oil Co., has ceased the direction of that department to devote all his time to the company's interests in Venezuela, where operations are carried on under the name Orinoco Oil Co. R. H. Carr, manager of the natural gasoline and gas departments of the Pure, will have charge also of production engineering.

LOS ANGELES, Feb. 24.—E. B. Fowkes, who had been acting as assistant sales manager for Emsco Derrick & Equipment Co., for some months, is commissioned to visit practically every foreign oil field in the world during the next 18 months, to introduce Emsco products. The first part of this year he will be visiting various oil fields in South America. He is expected back in the United States in about six months before starting on the trip that will take in other foreign oil fields.

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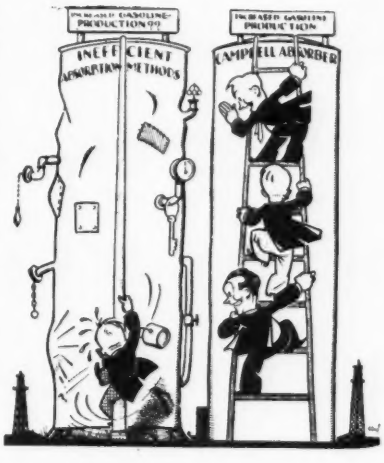

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Records for Checking Gasoline From Tank Car to Auto Tank

FORT WAYNE, Feb. 23

A SYSTEM to check gasoline movement from tank car on the marketer's railroad siding to the tank of his customer's automobile is to be found in a catalog S. F. Bowser & Co., Inc., Fort Wayne, Ind., is putting out on its Xacto Meas-ur-chek system of gasoline dispensing.

Four simple forms make up the system, which is designed to supplement the oil marketer's accounting system and make his records of gasoline movement into, through and out of his bulk and service stations more accurate.

The first form is made to fit a 9½ x 12-inch binder. It contains space for records of eight tanks, or all the tanks in a plant can be checked as one. There are columns for the numbers of the tanks, the grade of gasoline in each, gallons on hand, receipts, total supply, deliveries, gallons on hand, and a gauge stick or indicator reading for comparison with meter readings. Under the receipts heading are columns for initials and numbers of incoming tank cars, volume of gasoline billed from refineries at 60 Fahr., unloading temperature, volume corrected to unloading temperature, meter readings both before and after unloading, actual gallons received as shown by the meter. Under deliveries there are headings for meter readings before and after deliveries, and volume delivered.

The second and third forms are made to fit 4½ x 8½-inch binders. The second form is called the Bulk Plant Delivery Report. It has blank lines for recording the tank wagon number, time, date, destination of gasoline and a line where the bulk station agent signs his name, certifying the delivery. This form has lines for four compartments of a tank truck. Column headings are compartment number, grade of gasoline, volume on hand, meter reading before loading, meter reading after loading, volume delivered, and total load. The tank wagon driver receipts the report at the bottom.

The third form is called the tank wagon delivery slip. At the top it has space for the tank wagon number, destination, date and time unloaded. Below are lines for four compartments. Column headings are: compartment number, grade of gasoline, meter reading before delivery, meter readings after delivery, and volume unloading, with a total line at the foot of last column. At the bottom of this report are receipt blanks, one the service station attendant signs indicating he received the gasoline, and the other the tank wagon driver signs for any cash he may receive.

A service station daily report fits a binder 14 x 17 inches. This report has space for receipts, sales and stocks of gasoline, with spaces for meter and meas-ur-chek checks. There also is space for keeping record of bulk and packaged motor oils, grease and miscellaneous supplies, and services sold, such as chassis greasing and car washing. There is place for the recording of collections, and space for a summary of all the day's activities at a service station. At the bottom are spaces for signing by the service station attendants and the clerk that audits the report.

All forms are made in duplicate. One copy of the bulk plant report is retained at the plant and one copy is sent to the company or division office. One copy of the bulk plant delivery report goes to the tank wagon driver or customer, and the other is sent to the office with the bulk plant report. The tank wagon driver attaches his copy to his tank wagon delivery slips. There should be a balance between the bulk plant delivery and tank truck delivery reports.

One copy of the service station report is kept at the station and one goes to the company's office. The station's copy of the tank wagon delivery report is attached to the station's daily report. The company's auditor also gets the duplicate meas-ur-chek tickets, the sum of which should tally with the sales shown on the service station report.

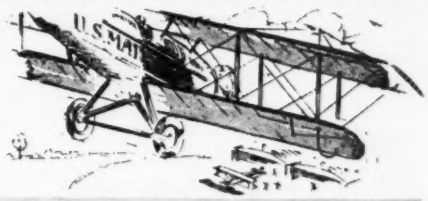
Michigan Valvoline Men Hold Get-Together

DETROIT, Feb. 24.—Michigan distributors of the Valvoline Oil Co., held a pleasurable get-together in the Statler hotel here Feb. 1. There were 44 guests from 32 jobbing companies. Robert Bruce White of Chicago was toastmaster at the banquet.

John J. Cox, president of the Michigamme Oil Co., of Ann Arbor, made a formal talk. Ed F. Schlee, president of the Wayco Oil Corp., Detroit, entertained the guests with stories of his attempted round the world flight in the Pride of Detroit last spring.

Earl Fay, representative of the Bennett Pumps Corp., Muskegon, Mich., was in the party to entertain with his merry stories. And A. D. Dubuisson, head of the Wolverine Service Stations Inc., South Haven, Mich., contributed some of the Swedish dialect stories for which he has become famous among the Michigan oil jobbers.

NIAGARA METER TRAVELS



No. 7

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AT the Buffalo, New York airport, time is an important factor in the daily life of the air mail pilot for every minute that is lost in delays means a minute that must be made up if the regular flying schedule is to be kept. In order to provide quick service on refueling incoming and outgoing planes, this airport maintains a very efficient method. As soon as a plane lands, the tank truck drives out to meet it and the gasoline is transferred without delay. And a Niagara Oil Meter plays a big part in this procedure, for it *accurately* checks and records every gallon of gasoline that is pumped. This meter is of the 1¼ inch D. V. type and measures up to 25 gallons per minute *accurately!* The meter is always filled with gasoline, thereby eliminating the possibility of air being measured.

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Visiting Around the Refineries

By Paul Truesdell

National Petroleum News

Another Side to the Freezing Question

GEORGE H. TABER, vice president of the Gulf Refining Co. in charge of refineries, writes me as follows: "I have read your 'Freezing as a Drag on Refining Operations' in the issue of Feb. 15 (page 72) and notice that you are inclined to make a case in favor of, say, Houston as against, say, Cleveland as an oil refining center. True, in Cleveland the use of steam for keeping the refinery heated, and the losses of heat by radiation from boilers and stills, would be far greater than in the southern city, but if you think that men do not move around faster in the icy blasts of Cleveland than they do in the humid heat of the south in August, I think you have not seen as much of conditions in the two places as I have. When you speak of 'these days of hot competition' the expression is quite apropos in discussing the advantages of the climate of the south.

"When it comes to a matter of the saving from availability of cold condensing water for the stills, and lessened evaporation from products in tanks, there is something to be said in favor of the northern location against the southern one.

"However, regardless of which of the two factors mentioned above may preponderate, I believe that freight costs will likely continue to be the controlling factor in the location of the refineries."

North Texas Refinery to be Sold

IT IS always a rather dismal matter with me to record the disposal of a refinery property at forced sale. Now it is the Iowa Park refinery of the Interstate Gasoline Co. The property is advertised to be sold pursuant to court order on March 20 at the courthouse in Wichita Falls, Texas.

The plant is described as having average daily capacity of 2,000 barrels of crude, two 20,000-barrel tanks, one 55,000-barrel tank, one 10,000-barrel, two 2,500-barrel, two 1,000-barrel, six rundown tanks and one agitator. Fifteen acres of land is included in the deal.

C. H. Gannon, N. H. Colwell and Joseph P. Tumulty are the ancillary receivers of the property. Mr. Gannon's address is given as 905 Scott Ave., Wichita Falls.

Long Distance Witness Championship

A DAILY newspaper in St. Louis recently conferred on Dr. Gustav Egloff, technologist of the Universal Oil Products Co., the title of champion long distance expert witness on oil cracking. Dr. Egloff, the paper states, is a witness for his company in the patent suit brought by it against the Standard Oil Co. of Indiana charging that the Standard's cracking operations have infringed the Dubbs patents.

Dr. Egloff, it is related, took the witness stand for cross examination on Nov. 2, 1927, and is still at it.

A Flying Field at Port Arthur

THE TEXAS CO. is another company that is taking an active interest in the promotion of aviation. The company has prepared a fine flying field at Port Arthur and has bought a plane for use on company business. F. P. Dodge, general superintendent of the Port Arthur refinery, and W. K. Holmes, first assistant general superintendent, recently have done considerable flying.

Another Thought on Refinery Fuel

A THOUGHT new to us is raised by Luis de Florez in his paper read before the A. I. M. E. meeting in New York and published in the Feb. 22 issue of NATIONAL PETROLEUM NEWS. The author places so great emphasis on the importance of physical control of refining operations that he questions the advisability of using acid sludge, low grade dirty fuel oil and the like under stills because of the variation in firing caused by such fuels. Maybe it is false economy to burn them in the refinery after all. Mr. de Florez suggests their use under boilers rather than under equipment where oil refining processes are going on.

Pipe Fitter Averts Serious Fire

D. CRYER, a pipe fitter at the Bossier City, La., refinery of the Louisiana Oil Refining Corp., by his courage and presence of mind prevented what undoubtedly would have been a bad fire, according to a recent issue of the Loreco Diamond, company house organ.

A gage line on one of the tube and tank cracking coils froze, expanded and then broke. Hot oil back pressured, catching fire on exposure to the air. Mr. Cryer climbed on top of the coil and closed a shutoff valve, thereby stopping the flow of oil.

No Fear of Freezing at This Plant

RIGHT along the line of freezing of refinery equipment in the winter time, the Muskogee correspondent of the Pure Oil News, in talking about that refinery says: "Although King Winter has been with us for about a week now we have experienced very little trouble from freeze-ups. We do not dread cold weather this winter as we have in the past since the two new boilers have been installed. Before this we were always short of steam around the plant during the cold winter days."

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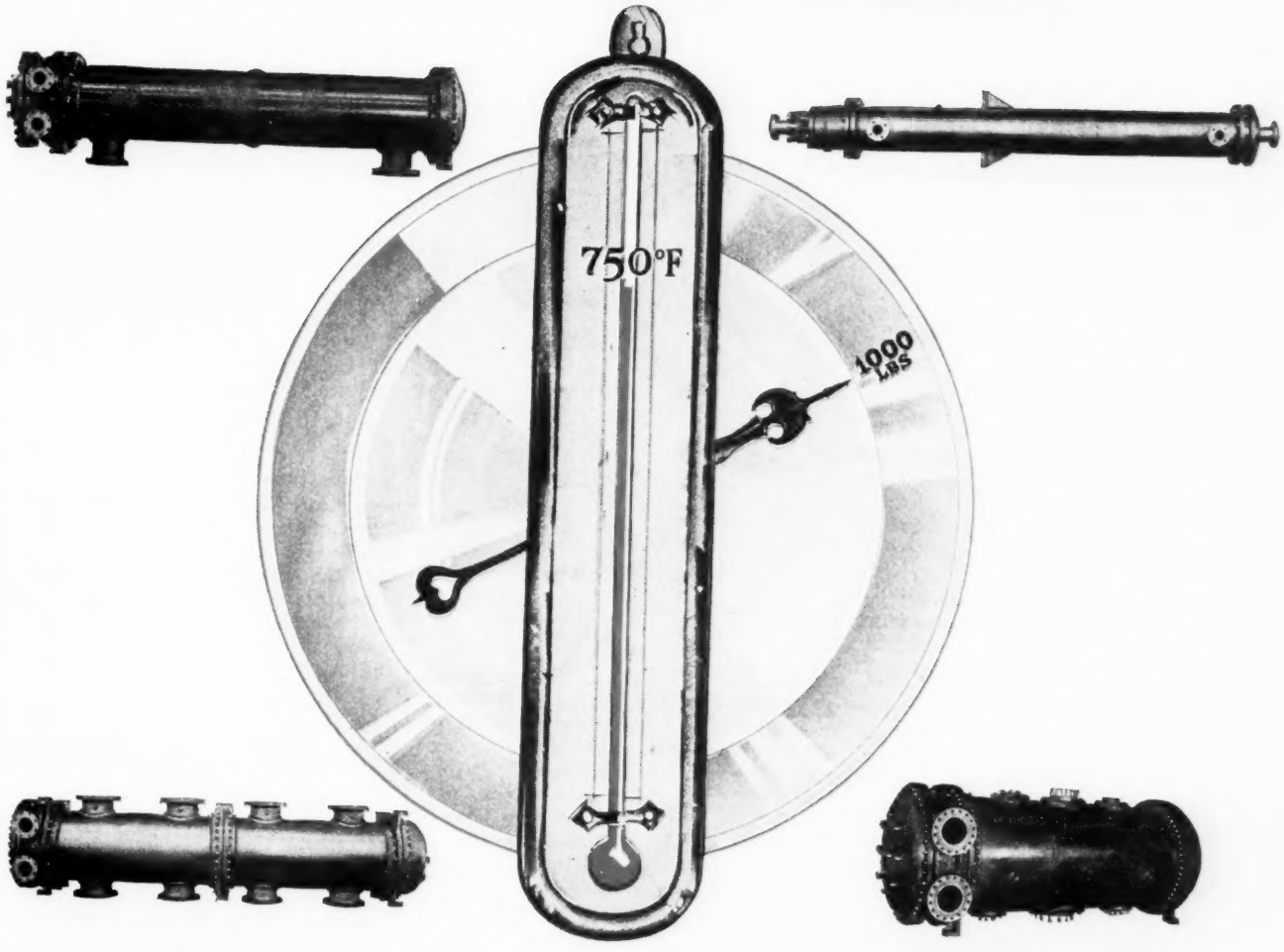
EXCHANGERS



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Our Industry — A Page of Facts and Personalities

National Petroleum News

By Paul Wagner

E. C. EDWARDS, chief geologist of the Exploration Co. of Texas, has been elected a director, succeeding M. L. Mertz of the San Angelo National Bank, whose health prevented his serving longer. Other directors, all re-elected, are A. A. DeBerry, T. R. Cowell, Jr., A. S. Everest and E. R. Perry of San Angelo; J. H. Holmes, C. F. Pugh, T. R. Cowell, Sr., and J. G. Farquhar of Pittsburgh. E. R. Perry was re-elected president at the directors' meeting; J. G. Farquhar, vice president; C. E. Pugh, secretary-treasurer; C. Brogan and A. A. DeBerry, Pittsburgh and San Angelo, respectively, assistant secretaries.

* * *

C. W. WISE, who resigned as chief scout of the Texas Pipeline Co., at Fort Worth, more than a year ago, has re-entered its service. Walter's headquarters for the present are at Pyote, one of the west Texas "ports of entry" to the Hendricks development area in Winkler county.

* * *

B. F. POSTLETHWAIT, drilling superintendent of The Texas Co., with Breckenridge headquarters, has moved temporarily to the McCamey district, Upton county, Texas. Otto Cabiness is carrying on in the Breckenridge district in his absence.

* * *

C. H. LIEB, Tampico manager of the Transcontinental Petroleum Co., subsidiary of the Standard of New Jersey in Mexico, and H. K. V. Tompkins, agent of the Mexican Gulf Oil Co., at Tampico, are newly elected vice presidents of the American Chamber of Commerce there.

* * *

WHEN Col. Charles A. Lindbergh reached Cartagena, Colombia, on his South American air tour he was the guest of H. O. Ware, now identified with petroleum affairs in that part of the world. Ware formerly was with Transcontinental Petroleum Co., at Tampico.

* * *

THE resignation of Byrd Hall, field geologist, reduces the San Angelo district geological staff of Marland Oil Co. of Texas to two men, D. D. Christner, in charge, and C. D. Vertrees of the sub-surface division. Hall will remain in San Angelo, but has not announced further plans.

ADRIAN C. MOORE

ADRIAN C. MOORE, vice president of Rycade Oil Corp., at Houston, is one of the most widely known of the younger group of operating executives in the southwest. Before his election as a vice-president, Mr. Moore served his company as Texas-Louisiana division manager in charge of land and leasing, principally in the Gulf coastal salt dome region.

Principal producing activities of the Rycade have been in the development of the Nash dome, where profitable operations have been carried forward since its discovery in 1924. The Rycade also has carried on wildcatting work elsewhere in the Gulf Coastal region and in the Maverick county division of the Interior Coastal plain.

Mr. Moore's recreation consists mainly of hunting and golfing, at which he is adept.

* * *

W. S. LINK, newly appointed personnel superintendent for the Lago Oil & Transport Co., stock-controlled by the Pan American and Standard of Indiana, is now on his way to Maracaibo after sailing from New York. Link formerly held a similar position with Huasteca Petroleum Co., another of the Pan American group companies, at Tampico.

D. DALE CONDIT, consulting geologist of Washington, D. C., is on a trip to Portuguese East Africa, from which region he is expected to return in February or March.

* * *

A. S. HENLEY, chief geologist of the Houston Oil Co. of Texas, is back in Houston after an absence of several months spent at Kerrville for his health.

* * *

W. S. FARISH, president, and Harry C. Wiess, refinery vice president, of Humble Oil & Refining Co., returned to Houston headquarters early in February after business trips to the east.

* * *

L. D. BEGGS, foreign sales manager of the National Supply Companies, has returned to New York headquarters after a recent trip to Tampico.

* * *

H. J. TSCHOPP, geologist, is again at Puerto Mexico, state of Vera Cruz, for the Mexican Eagle Oil Co., Ltd., (El Aguila) after a stay in Switzerland.

* * *

JOHN A. ROWE of the purchasing department has been elected president for 1928 of the Humble Club, an inter-company organization among employes of the Humble Oil & Refining Co., at Houston headquarters. Other new officers are Frank Statler, vice president; George W. Barry, secretary; H. E. McDonough, treasurer; and A. W. Taber, sergeant-at-arms.

* * *

ACTIVITIES of the Fuhrman Petroleum Co., in west Texas, will be directed from San Angelo by John I. Moore, geologist, who recently resigned from the staff of the Roxana Petroleum Corp.

* * *

W. E. & W. R. RAMSEY, Oklahoma City oil operators, recently acquired acreage in Muskegon county, Mich., near the location of Muskegon Oil & Gas Co.'s 125-barrel completion in 9-10N-16W. The Pure, Dixie and Ohio companies also have acquired "production" in the region.

* * *

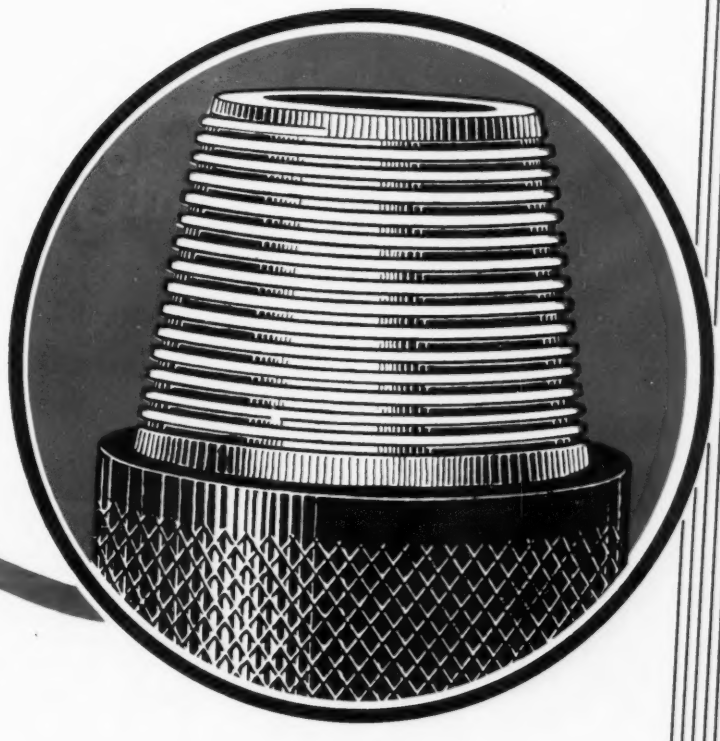
G. W. GOSLINE, formerly acting superintendent, has been made division superintendent of field operations and superintendent of pipeline affairs of the Union Oil Co. of California, Ventura county division, with headquarters at Santa Paula.

* * *

W. B. HEROY, geologist and engineer, identified with exploratory work of the Sinclair Consolidated Oil Corp., with New York headquarters, is now on a trip to South America. He will visit Venezuela and Colombia before returning home.

Longer Life

THE HUGHES TOOL JOINT



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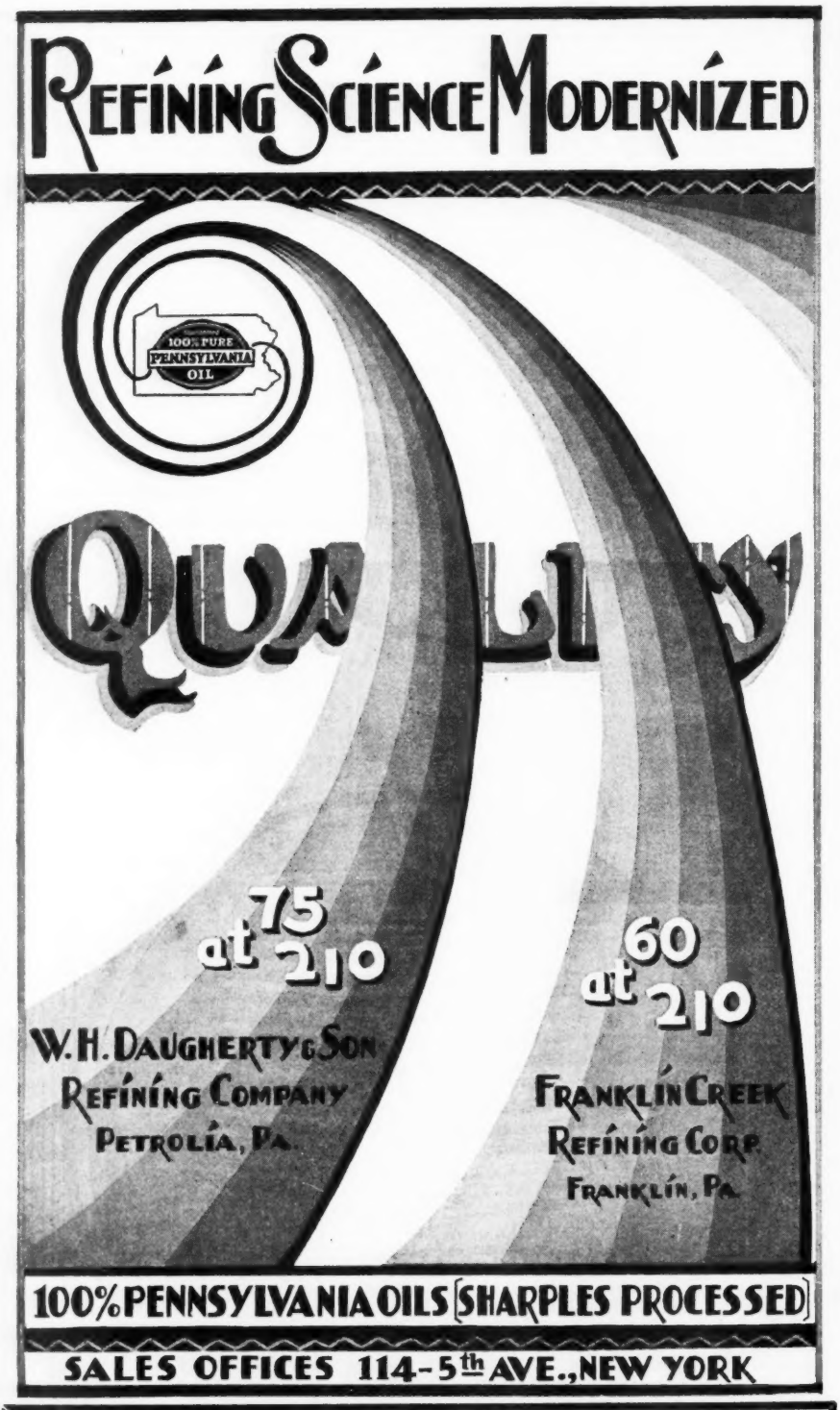
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As an additional service feature to its readers, this journal gladly offers to them an advance search free of charge on any mark they may contemplate adopting or registering. You may communicate with the Editor of this Department, or send your inquiry direct to the National Trade-Mark Company, stating that you are a reader of this journal.

"REFINOROIL" No. 256,295. The Hilliard Corp., Elmira, N. Y. For machine for reclaiming lubricating oil.

"LUBSEAL" No. 244,703. Lubrite Refining Company, St. Louis, Mo. For lubricating oils and greases.

"LIQUO-GAS" No. 256,413. Liquo-Gas Company, Erie, Pa. For liquid fuel which is not primarily an oil, but preferably volatile, for gasification or vaporization, especially for use for heating and illuminating.

"PENNLUBE" No. 258,477. The Manufacturers Oil & Grease Co., Cleveland, Ohio. For lubricating oil.

"KILNOC" No. 258,633. Grayburg Oil Company, San Antonio, Tex. For gasoline.

"AMLO" No. 258,774, Texas Pacific Coal and Oil Company, Fort Worth, Texas. For motor oils.

"SECURITY" No. 259,089. West India Oil Company, Bayonne, N. J. For illuminating oils.

"ARNOL" No. 256,094. The Arnol Company, Dallas, Texas. For lubricating oils.

Foreign Opportunities

Reserved information may be obtained from the Bureau of Foreign and Domestic Commerce, Washington, and its district and cooperative offices by duly registered firms and individuals upon written request by opportunity number. The Bureau does not furnish credit ratings or assume responsibility as to the standing of foreign inquirers; the usual precautions should be taken in all cases, and where no references are offered it does not necessarily imply that satisfactory references could not be given. Correspondence may be in English unless otherwise stated.

29407—**Kerosene and gasoline,** Hong Kong, China, purchase and agency.

29423—**Paraffin, cakes and flakes,** Hamburg, Germany, agency.

29424—**Lubricating oils and greases,** Casablanca, Morocco, agency and purchase.

29425—**Asphalt, large quantities,** Intra, Italy, purchase.

29426—**Lubricating oils, petroleum, greases,** Leipzig, Germany, purchase.

29427—**Lubricating oils,** Hamburg, Germany, purchase.

29428—**Lubricating oils,** Madras, India, purchase or agency.

29429—**Petrolatum, white and cream white,** Berlin, Germany, purchase.

29430—**Lubricating oils,** Magdeburg, Germany, agency.

29431—**Kerosene and petroleum products,** Thakurdwara, India, agency.

29469—**Oil, fuel, for Diesel engines,** Nassau, Bahamas, purchase.

29492—**Lubricating oils,** Bombay, India, purchase and agency.

29511—**Paraffin,** Hamburg, Germany, agency.

29514—**Lubricating oils,** Sao Paulo, Brazil, agency.

29606—**Petrolatum,** Berlin, Germany, purchase.

29607—**Petrolatum, and petrolatum oils,** Offenbach, Germany, purchase.

29627—**Oils, mineral, industrial,** Chemnitz, Germany, purchase.

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Leaky Foot-Valves have no effect on the measurement of the Pittsburgh Pump.

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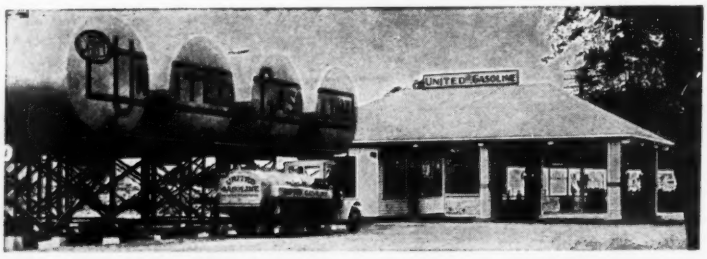

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AT PAINESVILLE, OHIO

The steel storage equipment shown in the picture, including tanks and supports, are of "Youngstown" make. The tanks are 10' 6" diameter x 40' long, each having 26,000 gallons capacity. This bulk storage station is owned by the United Oil Mfg. Company located at Painesville, Ohio.

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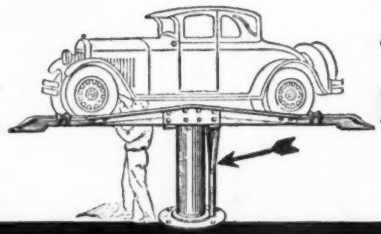

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New Patents

Feb. 7

REFINING

Oil-Tube-Tensioning Means—Arthur R. Weis, Huntington Park, Calif., assignor to Pacific Pump Works, Huntington Park, Calif. Filed Aug. 19, 1926. No. 1,657,651.

Oil-Well Plug—Ralph Irwin Henderson, Charleston, W. Va. Filed Sept. 25, 1925. No. 1,657,751.

Sucker-Rod Elevator—Don D. Brant, Long Beach, Calif. Filed Dec. 13, 1926. No. 1,657,780.

Well-Driller's Fishing Tool—Herbert E. Clark, Lynwood, Calif. Filed Nov. 12, 1926. No. 1,657,788.

Heat-Transfer Apparatus—Clive Morris Alexander, Waxachachie, Tex. Filed Dec. 15, 1923. No. 1,658,025.

Process for Treating Oils—Richard J. Dearborn, Summit, N. J. assignor to The Texas Company, New York, N. Y. Filed April 18, 1922. No. 1,658,077.

Process of Cracking Oils—John Collins Clancy, New York, N. Y. Filed Sept. 2, 1922. No. 1,658,116.

Refining Petroleum Oils—Paul McMichael, Flushing, N. Y., assignor to Hydrocarbon Refining Process Co., Inc., New York, N. Y. Filed Nov. 17, 1924. No. 1,658,171.

Process for Controlling Destructive Distillation of Petroleum Oil—Richard W. Hanna, Piedmont, Calif., assignor to Universal Oil Products Company, Chicago, Ill. Filed Feb. 12, 1923. No. 1,658,241.

Purification of Benzol, Petrol, and the Like—Kenneth Cox and Percival John McDermott, Manchester, England, assignors to Refiners Limited, Manchester, England. Filed Feb. 25, 1926. No. 1,658,285.

Process for Cracking Petroleum Oil—Robert T. Pollock, Boston, Mass., assignor to Universal Oil Products Company, Chicago, Ill. Filed Dec. 20, 1920. No. 1,658,415.

Apparatus for Treating Oils—George D. Sims, Independence, Kans., assignor to Universal Oil Products Company, Chicago, Ill. Filed June 17, 1921. No. 1,658,420.

Removal of Sulphur and Compounds from Hydrocarbon Oil—Gerald L. Wendt, Chicago, Ill., assignor to Standard Oil Company, Whiting, Ind. Filed July 16, 1924. No. 1,658,505.

Grease-Charging Apparatus—Herman J. Engbrecht, Chicago, Ill., assignor to Standard Oil Company, Whiting, Ind. Filed Oct. 10, 1925. No. 1,658,483.

PRODUCTION

Rotary Well Drill—Edward S. Hutton, Muskogee, Okla. Filed Oct. 6, 1924. No. 1,658,125.

Pump-Rod-Suspension Device—Edward E. Stevenson, Los Angeles, Calif., assignor to D. & B. Pump and Supply Company, Los Angeles, Calif. Filed Nov. 26, 1924. No. 1,658,212.

Sucker-Rod Coupling—Walter A. Sutton and Fay M. Kelso, Oxnard, Calif. Filed March 16, 1926. No. 1,658,264.

Art of Extracting Hydrocarbons from Oil-Bearing Strata—William L. Russell, New Haven, Conn. Filed June 8, 1923. No. 1,658,305.

Device for Inducing a Flow of Oil in Oil Wells—John V. Little, Kerto, Calif. Filed Sept. 1, 1926. No. 1,658,345.

Socket—Paul Arbon, Tulsa, Okla; Fidelity National Bank and Trust Company, Kansas City, Mo., and Lorne M. McLeod, Tulsa, Okla. Filed Jan. 14, 1926. No. 1,658,472.

Derrick—James P. Neilson, Sr., Tulsa, Okla. Filed Dec. 11, 1926. No. 1,658,535.

Apparatus for Cleaning Oil Wells—Jerome Wiesman, Denver, Colo. Filed Jan. 2, 1926. No. 1,658,697.

NATURAL GAS

Treatment of Natural-Gas Gasoline, Casinghead Gasoline, Natural Gasoline, and the Like—Harold B. Bernard, Tulsa, Oka., assignor to Sinclair Oil and Gas Company, Tulsa, Okla. Filed July 22, 1924. No. 1,658,322.

Apparatus for the Production of Carbon Black—William Farrell Fulton, Shreveport, La., assignor to Palmer Corporation. Filed May 31, 1927. No. 1,658,676.

MISCELLANEOUS

Covered Drain Pit and Grease Rack—Charles D. Fagan, Sharon, Pa., assignor to Sharpsville Boiler Works Co., Sharpsville, Pa. Filed Nov. 18, 1926. No. 1,658,044.

Oil-Shale-Distillation Apparatus—Chester D. Tripp, Evanston, Ill. Filed July 12, 1924. No. 1,658,143.

McDonald Safety Check Valve

FOR INSTALLATION INSIDE OF STORAGE TANKS

Reduces Fire Hazards And Insurance Costs

Insures Against Loss From Broken Valves

Plate 849
Patented 2-23-1926

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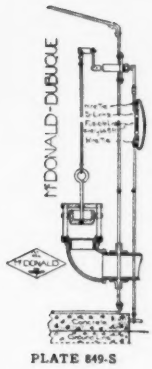

PLATE 849-S

Plate 849-S
Showing installation for operation through side of tank

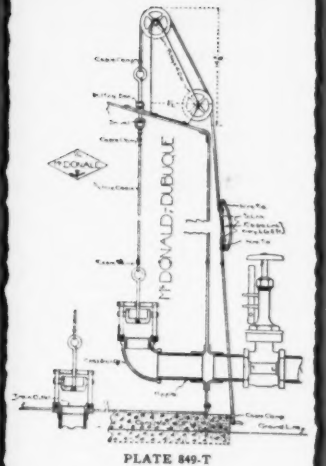

PLATE 849-T

Plate 849-T
Showing installation for operation through top of tank

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New Equipment to Improve Plants

Personal Notes of the Manufacturers

National Petroleum News

The Griscom-Russell Co., New York, has recently developed a heat exchanger and cooler, known as the G-R tubeflo section, designed to handle dirty or corrosive liquids and gases. It is made entirely of semi-steel in order to withstand corrosion and the fluid passages are straight, smooth, cored holes which are easily cleaned. Various parts are standard and interchangeable. Sections can be made longer or shorter by changing the number of body pieces and they can be installed in stacks one over the other.

* * *

A. O. Smith Corp., Milwaukee, Wis., has announced these changes in the branch office representation of its oil and gas field products division through C. C. Joys, Jr., division manager:

Opening of an office in New York City in the Equitable Bldg., 120 Broadway, with Edward A. Livingstone, formerly of Los Angeles, in charge; and opening of an office at Houston, Tex. in the Neils Esperson Bldg., with J. R. McCrea in charge.

Mr. Livingstone was succeeded at Los Angeles by Henry A. Bourne, Jr. This division of the company handles the sale of Smithsteel cracking stills, casing couplings and gas line pipe for the company.

* * *

Pittsburgh Equitable Meter Co., Pittsburgh, Pa. recently concluded a four-day annual meeting of its district managers which was for the purpose of acquainting the men with any new products added to the line and with the improvements made in design and construction of other products.

* * *

Lewis-Shepard Co., 154 Walnut St., Boston, Mass., has designed what it calls its type R, or 180 singlelift truck which can be operated through a complete 180 degree arc. It is claimed to have a new lifting principle, combining a rolling movement and direct vertical thrust. Another claim made for it is that it makes gentle lowering of loads easy and prevents the tipping tendency of other trucks; it also elevates the load with a saving of from 24 to 33 inches over side lift, single stroke trucks, the company says.

* * *

S. R. Shoup, general sales manager of the Joseph Reid Gas Engine Co., Oil City, Pa., has returned to Los Angeles after a business trip to Oil City.

Blaw-Knox Co., Pittsburgh, manufacturer of steel products, has developed a new type of tracyfier, known as the pipeline tracyfier. It is a smaller purifier and is designed for use in several sizes of air, steam or gas lines up to three-inch.

Among the claims for this pipeline tracyfier is that it increases the output of machines by maintaining a more uniform hydrogen content in the gas in steam lines to gas producers. One tracyfier will also dry and clean the air for several tools, lowering out-of-service time and increasing output per tool.

The device is sold by the Andrews-Bradshaw Co., Pittsburgh, Pa., a division of the Blaw-Knox Co.

* * *

The Associated Supply Co., Los Angeles, manufacturer of oil field equipment, which was recently taken over by the Youngstown Sheet & Tube Co., Youngstown, O., will continue to operate under the former name in California, with headquarters at 724 Pacific Electric Bldg., Los Angeles, under the management of Bernard Dunn, vice president.

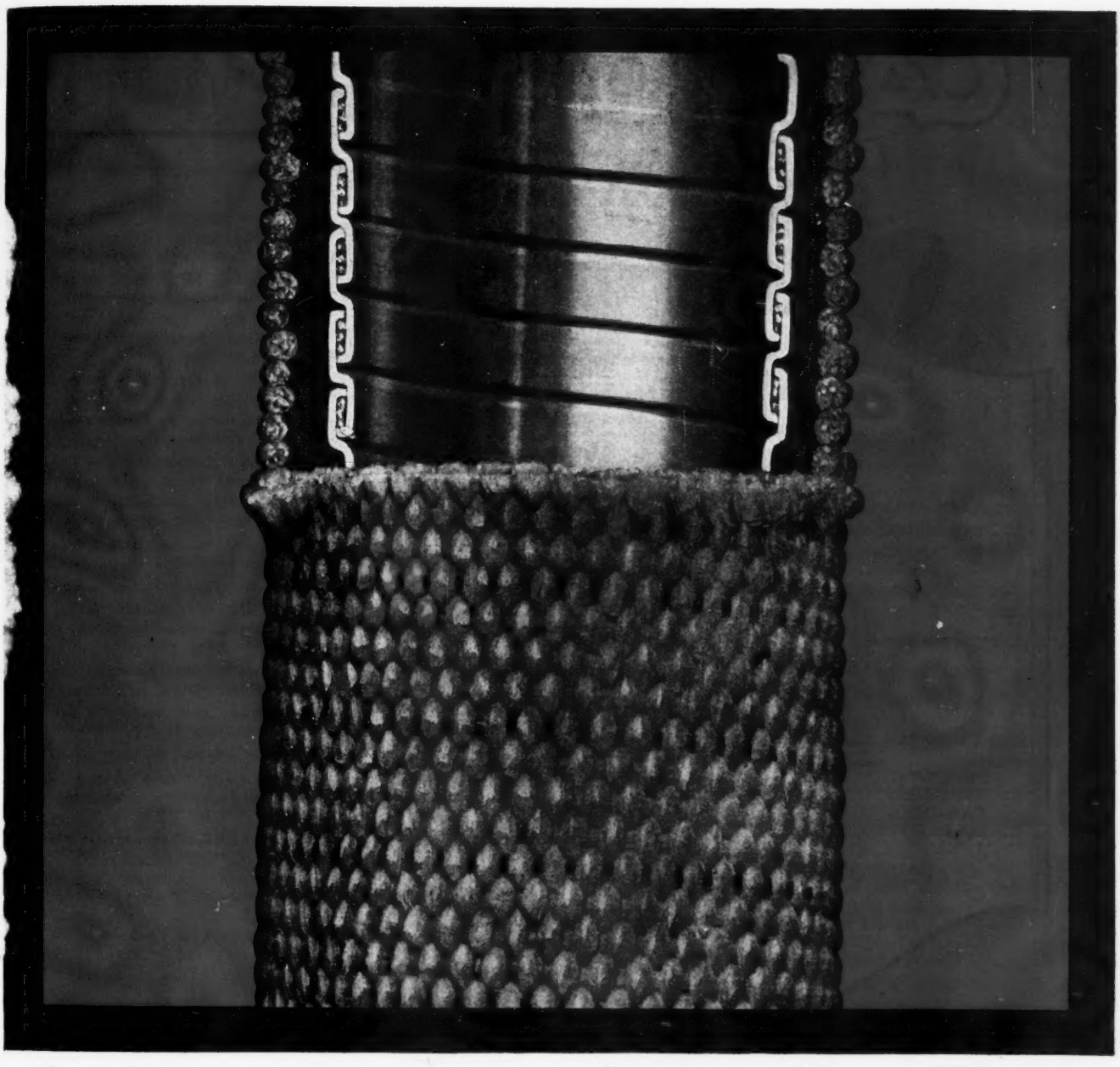
A purchasing department has been organized for the Associated to operate under the supervision of S. A. Joseph, purchasing agent. A. P. MacKillop, formerly purchasing agent of the Associated, is no longer with the company. Purchasing department offices are at the headquarters address.

* * *

Revolvator Co., Jersey City, N. J., has off the press a bulletin describing and illustrating Revolvator material handling equipment, such as portable elevators, liftrucks and barrel racks for various industrial uses. One illustration shows how the portelator and revolvator steel barrel rack quickly and easily handles oil barrels for moving from place to place.

* * *

The Wellman-Seaver-Morgan Co., 7000 Central Ave., Cleveland, O., has just published bulletin No. 89 on the Wellman supertest gate and globe valves which are designed for use under high pressures and temperatures in refineries, pipe lines, steam plants and other industrial plants. The valves have demountable cages and bodies and bonnets are machined from solid steel forgings and all parts are renewable in a few minutes. All valves conform to the dimensions of the American Engineering Standards Committee for Steel Pipe Flanges and the materials used conform to the American Society for Testing Materials specifications.



A Cross-Section of Gasoline Hose

This can be imitated

FIFTEEN years ago only *one* gasoline hose was made this way—TRIPLEXD. Today *all* makes of gasoline hose imitate this construction. Five years ago Triplexd Gasoline Pump Hose *ceased to be just gasoline hose* and became TWO YEARS INSURED DELIVERY of Gasoline from pump to automobile. Today TRIPLEXD Registered Insured Gasoline Hose* insures the hose user against replacement losses due to mishandling and accidents *as well as* against those due to ordinary wear and tear for 1000 DAYS from the time the hose leaves our factory. This insured delivery has *NO imitators!*

METAL HOSE & TUBING CO.
INCORPORATED
236 Tillary Street
BROOKLYN, N.Y.

**Triplexd Registered Insured Gasoline Hose is any length of Triplexd Filling Station Pump Hose ¾", 1", or 1¼" inside diameter, and not more than 15 feet long, shipped from our Brooklyn Factory on or after June 1, 1927*

CANNON BALL Service

THE quality of Cushing Products is excelled only by our service, expressed in the two words—CANNON BALL Service.

Phone, wire or write for quotations;

58-60 U.S. Motor Gasoline
64-66-375 E. P. Aviation
41-43 W. W. Kerosene
36-38 Straw Distillate
32-36 Gas Oil Uncracked
22-26 Fuel Oil (Cushing or
24-26 Fuel Oil Blackwell)

PRODUCING
REFINING
TRANSPORTING
MARKETING

Refineries at;
CUSHING and
BLACKWELL,
OKLAHOMA

CUSHING REFINING AND GASOLINE CO.
CUSHING, OKLAHOMA

Bring New Customers and Hold Your Old Ones

ALLISON COUPON BOOKS
Accurate—Compact—Convenient

Popularize the coupon book habit at YOUR filling stations. Sales organizations, truck fleets and individual drivers prefer this plan once they try it. Allison Coupon Books are absolutely accurate. Furnished in stock or special designs. Send for samples and prices.

Allison Coupon Company
Indianapolis, Indiana
Coupon Book Specialists Since 1888

New Stations Building

Okeene, Okla.—Okeene Oil Co. will erect filling station.

Mineral Wells, Tex.—S. L. Stevens will erect filling station.

Brownwood, Tex.—H. C. Grady is completing filling station.

Morrillton, Ark.—E. R. Keese will erect filling station.

Geuda Springs, Kan.—Lloyd Cummins is building filling station.

Fenton, Mich.—J. O. Nelson is completing filling station.

Savannah, Ga.—Fred J. Howden seeks permit for filling station.

Johnstown, Pa.—Andrew C. Fisher seeks permit for filling station.

Wilmington, Dela.—Pittsburgh Independent Oil Co. will build filling station.

Baltimore, Md.—Hanover Realty Co. seeks permit for filling station.

Baltimore, Md.—Isidore Losin seeks permit for filling station.

Wilmington, Dela.—Standard Oil Co. of New Jersey will erect filling station.

Boston, Mass.—Clothilde E. Jones seeks permit for filling station.

Pittsfield, Mass.—Tide Water Oil Co., New York City, seeks property for filling station.

Dubuque, Ia.—Conzett Co. will build filling station.

Marcus, Ia.—Community Co-Operative Oil Co. will build filling station.

Jefferson City, Mo.—Kemp Asel, manager of the City Tire & Battery Co., will build garage and filling station.

Marshall, Tex.—Dan W. Rudd will build filling station.

Carrollton, Mo.—Fred Brockmeier will erect filling station.

Fort Smith, Ark.—Allen Henderson will build filling station.

Pawnee City, Neb.—Lewis Borden will erect filling station.

Cambridge, Mass.—Moses H. Gulesian will erect two filling stations.

Cambridge, Mass.—Mary J. Daly seeks permit for filling station.

Oshkosh, Wis.—H. T. Bork and E. T. Iverson will build filling station.

Rock Rapids, Ia.—John Grimm is completing filling station.

Ironwood, Mich.—Orlo King will build filling station.

Williston, N. D.—Farm-Pennsylvania Oil Co., recently organized by farmers and business men here, may build filling station.

Mankato, Minn.—Key City Oil Co. will build filling station.

Bellevue, Ia.—William F. Norpel will erect filling station.

Fort Smith, Ark.—Tom B. Norris will build filling station.

Columbiana, O.—W. W. Coy will build filling station.

Niles, O.—John Rose is completing filling station.

Bellefontaine, O.—Louisiana Oil Refining Corp. will build bulk station.

Kearney, Neb.—White Eagle Oil & Refining Co., Kansas City, Mo., will erect filling station.

ON THE LAZY BENCH

National Petroleum News

An aspiring dramatist called upon the producer to whom he had sent his first work. Greeted with a curt nod and a few brief words, he addressed the theatrical "big noise."

"You've had my play for more than three weeks now," he said, "and the last time I called, you said you hoped to find a suitable use for it."

The producer frowned. He was a very busy man.

"So I did," he began suavely. "And I'll use it as promised. We're starting a new play next week, and I'll tell you what I'll do. I'll tear up your play and we'll use it in the big snow scene."

—*Magnolia Oil News.*

* * *

"I have always had a presentiment," she said, "that I should die young."

"Well, dearie," remarked her woman friend, "you didn't, after all, did you?"

—*Pure Oil News*

* * *

Thinking to put the young couple at their ease the conductor remarked pleasantly:

"Did you know that the tunnel we just came through cost $12,000,000?"

"Did it?" inquired the girl. Then she added, after a pause, "Well, it was worth it."

—*Skelly News.*

* * *

The picnickers were forced to cross the railroad tracks. Little Don ran ahead and saw a train approaching. Eagerly he called to his father, still on the track: "Hurry, daddy, or else quick throw me that lunch."

—*Magnolia Oil News.*

* * *

"How did the Smith wedding go off?"

"Fine until the parson asked the bride if she'd obey her husband."

"What happened then?"

"She replied, 'Do you think I'm crazy?' and the groom, who was in a sort of doze, replied, 'I do.'"

—*Pacific Gasoline Booster.*

* * *

Patient: "Doctor, how are my chances?"

Doctor: "Oh, pretty good, but I wouldn't start reading any continued stories."

—*Skelly News.*

* * *

"What are those holes in that fence?"

"Why, those are knotholes."

"Why, those are too holes!"

—*The Loreco Diamond*

A proud young father wired the news of his happiness to his brother in these words:

"A handsome boy has come to my house and claims to be your nephew. We are doing our best to give him a proper welcome."

The brother, however, failed to see the point, and wired back:

"I have no nephew. The young man is am imposter!"

—*Skelly News.*

* * *

"Bredren," said the colored preacher, "you have come to pray for rain. Bredren, de foundation of religion am faith. Whar is yo' faith. You comes to pray foh rain and not one of you brings his umbrella."

—*Magnolia Oil News.*

* * *

Spain has her matadors.

The United States has her senators.

—*Pure Oil News*

* * *

"Flo says she's been offered a name part in Shakespeare. Do you believe it?"

"Yes, I expect it's 'Nothing' in 'Much ado.'"

—*Skelly News.*

* * *

"Would you care to follow your former trade?" asked the governor of the new arrival at the prison.

"I certainly would, sir."

"What was it?"

"A sailor, sir."

—*The Loreco Diamond*

* * *

Mrs. Flynn: "The neighborhood seems a bit noisy, Mrs. O'Day."

Mrs. O'Day: "Shure en it does. The only time it's quiet here is when the trucks go by an' drown th' noise."

—*Magnolia Oil News.*

* * *

"My daughter has fallen in love with the radio announcer at KXKZ."

"Is it serious?"

"It is. Her bill for applause telegrams this month was $49.80."

—*Pure Oil News*

* * *

Sunday School Teacher: "Now, Willie, what happens to a man who never thinks of his soul, but only of his body?"

Willie: "Please, teacher, he gets fat."

—*Skelly News.*

* * *

A young man who had taken his Ford out on a cold wintry day was covering the engine with a blanket.

"Little Boy (looking on): "Don't cover it up, Mister, I saw what it was."

—*Magnolia Oil News.*

Bottle Fold Type Folio

Your Name in Gold Free

Complete with Bottle Fold and Bottles *only* $15.30

364—A very complete and practical folio made from heavy 5-oz. black cowhide. 3¼-inch pocket that holds leather handled bottle fold. Contains sixteen 4-oz. plain bottles. One-inch pocket for stationery. Leather case containing six ½ oz. jars $3.25 additional.

Other styles in our FREE Catalog

L-U-C-E

Builders of Sales Luggage

614 Delaware Kansas City, Mo.

Neutrals for AUTO OILS!

Refined from genuine Kentucky crude.

PARAFFINE BASE.

Filtered through Fuller's Earth.

Wax pressed out.

Excellent for turbine and motor oil compounding.

Our fleet of 75 tank cars assures prompt service.

Assorted cars our specialty.

Whatever you want—a can or a carload—*be sure to get our prices!*

STOLL OIL
REFINING COMPANY

Incorporated *Main Office and Refinery:* *Est. 1896*

LOUISVILLE, KY.

Cable Address: STOLOIL, LOUISVILLE

THE SATURDAY EVENING POST

See the March 17th Saturday Evening Post

In that issue starts the Big Spring

FRY FLUSHER

national advertising campaign

FRY is going to sell millions of extra pounds of grease for the oil industry in March. Get your share of it Order your Flusher today

Refinery - Tank Wagon Markets

National Petroleum News

Domestic Gasoline Demand Fair, Exporters Renew Activities

Staff Special
TULSA, Feb. 25

THE series of crude oil price changes in various parts of the country this week furnished the major interest for Mid-Continent refiners. The low gravity oil reduction and the high gravity advance developed much speculation as to the ultimate effect the changes will have on the refined oil markets.

The most noticeable effect was to lend stronger support to the better position gasolines have been in since the first of the year. Many expressed the opinion that this better position was due in part to a feeling among the trade that some sort of crude change would be made early this year, and that the change accordingly had already been discounted in most quarters even before the announcement by the Carter Oil Co. last Monday.

Shipments of all major products continued on a comparatively good basis throughout the week, a majority of refiners reported. Domestic demand for gasolines was fair in most parts of the consuming territory, although there were localized spots where demand was slack on account of weather conditions.

Exporters renewed interest in the market around the middle of the week. One company bought approximately 1,000,000 gallons of 64-66, 375 e.p. gasoline from an Oklahoma refiner at 6.50 cents a gallon. At least four export companies late in the week were in the market in north Texas attempting to buy 64-66, 390 e.p. gasoline at 6.375 cents a gallon, and 64-66, 375 e.p. goods at 6.625 cents. Only small lots were reported picked up by the exporters, due primarily to the fact that north Texas refiners still have a sufficient volume of business on their books to prevent them from accumulating any quantity of goods before the end of the month.

The going price of 58-60, U. S. Motor this week from Oklahoma refiners reporting daily sales has been 6 cents and above. Virtually no goods was moved at any time during the week to jobbers at under that price, and reports from resale buyers indicated they too were having to pay 6 cents in a majority of instances.

Higher gravity gasolines have been unchanged in both price and demand. A few refiners said that some of their trade who had been taking considerable high gravity goods had been making inquiries for 437 e.p. gasolines lately, probably in anticipation of milder weather in the consuming territory and the resultant shift from the winter grades of gasolines.

Natural gasolines lost some ground this week. Buying was not on as large a scale as prior to the middle of the month, and a few companies late in the week began pushing their goods on the market in an effort to get cleared before the end of February.

Grade AA which would move on export rates was in fairly good demand, but there were quantities of goods at points which do not take an export rate but can move to domestic points in the Standard of Indiana territory, and manufacturers making this gasoline found their domestic business considerably slower.

The lower grades lost from .125 to .25 cents a gallon, with Grade BB and Grade C freely offered from several sources.

Kerosenes showed no price changes during the week. Demand was reported somewhat better in a few quarters, while other refiners said their business was quiet. Exporters showed little interest and the jobbing trade apparently was not ready as yet to buy heavily in anticipation of the spring demand.

DISTILLATE business was good in the northern part of the territory, but few spot orders were being received for shipment in this section of the consuming area. Most of the goods shipped was on contracts. Movement was sufficiently good, however, for prices to remain unchanged.

Gas oil eased off slightly around the middle of the week when one large buyer obtained around 150 cars at prices ranging from 2.125 to 2.375 cents a gallon. This purchase, however, was made from a sufficient number of refiners to cause an immediate strengthening in price, with the result that today no 32-36 gravity gas oil was obtainable under 2.50 cents. The bulk of the purchase mentioned moved out immediately, and was for shipment to an eastern industrial user.

An export buyer, meanwhile, was inquiring for 15,000 barrels of dark and straw gas oils in north Texas. No purchases had been reported up to the close of business today. The prices offered were not revealed.

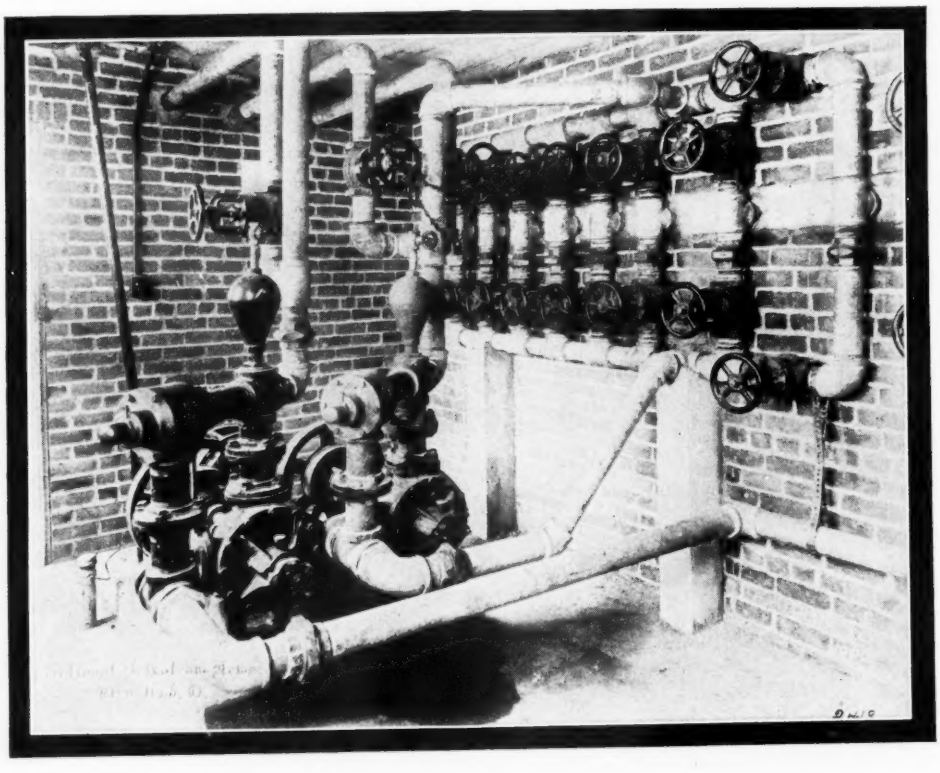
FUEL oils were reported still scarce in Oklahoma for spot shipment. Refiners for the most part continued to ship heavily on sales contracted earlier in the month. Buyers report they are getting quotations for March at prices on a level with, and in a few cases higher than the prevailing spot market. One large buyer said he was being quoted .775 cents a barrel for 14-16 gravity oil, .85 to .875 cents for 24-26 gravity, .90 to .95 cents for 26-30 gravity, and $1.05 for 30-32 gravity oil.

A few refiners reported their neutral and cylinder stock business was showing a slight increase, while others said the slow season for these commodities was not over as yet, as far as they were concerned. There apparently was not as much effort being made this week to move certain grades as has been the case the past six weeks or two months. Prices on all grades were virtually unchanged.

Wax prices remained unchanged. Several refiners continued to report being completely sold up even through March, and the prevailing quotation was around 3.125 to 3.25 cents a pound for 124-126 white crude scale wax.

Gulf Coastal Lubes Steady

HOUSTON, Feb. 27.—Gulf Coastal lubricant markets are steady and without change in the general price structure. A few adjustments have been made on individual grades, but otherwise the list remains unchanged. Sale of trademark grades is being emphasized wherever possible and manufacturers active in such markets report steadily growing demand.



At the Cities Service Oil Co. New Bulk Station at Detroit

The Cities Service Oil Co. has been buying Blackmer Pumps for a long time.

The halftone above shows one of their more recent purchases—a double electric unit which is installed at their new bulk station in Detroit. Each pump on this unit has a capacity of 200 g.p.m. Both are equipped with by-pass and relief valve for protection to the piping and the pumps in case of accidental closing of the discharge line while the pumps are in operation.

At the Ft. Dodge, Iowa, station of this company is a Blackmer Pump which was in operation for more than 10 years without repair. According to their district manager, Ft. Dodge is a busy place and the pump has had to withstand some mighty severe service. When repairs were necessary, the cost was negligible.

Perhaps it is performance like that which causes not only the Cities Service Oil Co. but many others as well, to stick pretty close to Blackmer Pumps when they are in need of bulk station pumping equipment.

Blackmer Maid

Ask for a copy of the new Blackmer Catalog which is now ready.

Blackmer Pump Co.

1809 Century Ave.

Grand Rapids, Mich.

Offices in 20 principal cities

Refinery Markets on Light Oils and Lubricants

Prices given below are in cents per gallon, F. O. B. refinery, except where $ is shown

(These Refinery Prices compiled in the OIL PRICE HANDBOOK for a whole year)

GASOLINE AND NAPHTHA

PENNSYLVANIA	Prices Feb. 27	Prices Feb. 20	Prices Feb. 13
52-54 Naphtha	7.75 – 8.00	7.75 – 8.00	7.75 – 8.00
54-56 Naphtha	7.75 – 8.00	7.75 – 8.00	7.75 – 8.00
58-60 U.S. Motor 437 e.p.	7.75 – 8.00	7.50 – 8.00	7.50 – 8.00
60-62 390 e.p. gasoline	8.25 – 9.00	8.25 – 9.00	8.25 – 9.00
64-66 375 e.p. gasoline	9.00 – 9.50	9.00 – 9.50	9.00 – 9.50
68-70 Str.-run gas. 350-360 e.p.	10.00 –10.50	10.00 –10.50	10.00 –10.50
OKLAHOMA			
48-50 450 e.p. naphtha	†5.50	†5.50	†5.375– 5.50
50-52 450 e.p. naphtha	†5.50	†5.50	†5.375– 5.50
56-58 450 e.p. gasoline	**5.75	**5.75	**5.50 – 5.75
58-60 450 e.p. gasoline	**5.75 – 6.00	**5.75 – 6.00	**5.50 – 5.875
64-66 390 e.p. gasoline	6.50 – 6.75	6.50 – 6.75	6.50 – 6.75
68-70 350-360 e.p. gasoline	7.00 – 7.25	7.00 – 7.25	7.00 – 7.25
OKLAHOMA (Weighted Average Prices)			
58-60 U. S. Motor, 437 e.p.	6.2056	6.1440	6.0980
60-62 437 e.p. gasoline	6.4886	6.5080	6.4677
60-62 400 e.p. gasoline	6.8125	6.6500	6.5000
64-66 375 e.p. gasoline	7.2500	7.0417	7.0250

Above are weighted average prices, current week's prices being effective on Saturday, instead of Monday, the last day on which weighted averages are available for publication in this table. Weighted average prices for the current Monday are published on page 37 of this issue. The two previous week's prices shown are corrected to show Monday's prices, effective on the dates shown at the top of the columns.

KANSAS (F. O. B. refinery Kansas destination)			
58-60 U.S. Motor 437 e.p.	6.375– 6.50	6.25 – 6.375	6.25 – 6.375
60-62 400 e.p. gasoline	6.75	6.75	6.75
64-66 375 e.p. gasoline	7.375	7.375	7.375
NORTH TEXAS			
48-52 450 e.p. naphtha	†5.50 – 5.75	†5.50 – 5.75	†5.50
56-58 450 e.p. gasoline	†5.75	†5.75	†5.50
58-60 450 e.p. gasoline	†5.75 – 5.875	†5.75 – 5.875	†5.50
58-60 U.S. Motor 437 e.p.	†6.00 – 6.25	†6.00 – 6.25	6.00 – 6.25
60-62 400 e.p. gasoline	6.25 – 6.375	6.25 – 6.375	6.25 – 6.375
64-66 390 e.p. gasoline	6.375– 6.50	6.375– 6.50	6.375– 6.50
64-66 375 e.p. gasoline	6.75	6.75	6.75
68-70 350-360 e.p. gasoline	7.125– 7.25	7.125– 7.25	7.125– 7.25
NORTH LOUISIANA (N. La., Ark. and Miss. destination)			
58-60 U.S. Motor gasoline	6.375– 6.50	6.375– 6.50	6.25 – 6.50
ARKANSAS (Arkansas destination only)			
56-58 450 e.p. gasoline	6.25	6.25	6.25
58-60 450 e.p. gasoline	6.25	6.25	6.25
58-60 U.S. Motor 437 e.p.	6.50	6.50	6.50
CALIFORNIA			
*54-58 U.S. Motor 437 e.p.	7.50 – 8.50	7.00 – 8.50	7.00 – 8.50
*58-60 U.S. Motor 437 e.p.	8.25 –10.00	8.00 – 9.50	8.00 – 9.50
*42-45 Eng. dis. 445-480 e.p.	6.50 – 7.00	6.50 – 7.00	6.50 – 7.00

*2c tax to be added if used in state.

NATURAL GASOLINE

(Note: End point of all grades, not over 375 F. Since Oct. 1, 1927 all naturals must pass corrosion test.)

OKLAHOMA			
Grade AA, 80-87.9, 90% Recovery	†5.50	†5.50 – 5.75	†5.375– 5.625
Grade A, 72-79.9, 90% Recovery	†5.50 – 5.625	†5.50 – 5.75	†5.625
Grade BB, 84-92, 85% Recovery	†4.25 – 4.50	†4.625	†4.625
Grade B, 76-83.9, 85% Recovery	†4.50	†4.75	†4.75 – 4.875
Grade C, 80-90, 78% Recovery	†4.25	†4.25 – 4.50	†4.25 – 4.375
NORTH TEXAS (F. O. B. Breckenridge)			
Grade AA, 80-87.9, 90% Recovery	†5.50 – 5.625	†5.50 – 5.75	†5.375– 5.625
Grade A, 72-79.9, 90% Recovery	†5.50 – 5.625	†5.50 – 5.75	†5.375– 5.625
Grade BB, 84-92, 85% Recovery	†4.375– 4.625	†4.625	†4.625
Grade B, 76-83.9, 85% Recovery	†4.375– 4.625	†4.75 – 4.875	†4.75 – 4.875
Grade C, 80-90, 78% Recovery	†4.25	†4.375– 4.50	†4.50
NORTH LOUISIANA (F. O. B. Monroe District)			
Grade AA	†5.75	†5.75 – 6.00	†5.75 – 6.00
Grade BB	†4.75 – 5.00	†5.00 – 5.25	†5.00 – 5.25
Grade C	†4.50 – 4.625	†4.75 – 5.00	†4.75 – 5.00
CALIFORNIA			
75-85, 375-390 e.p. blend	8.00 – 8.50	7.50 – 8.00	7.00 – 7.50

MOTOR FUEL BLENDS

PENNSYLVANIA			
68-70 Blend 437 e.p.	Prices	.....	.....
64-66 Blend 437 e.p.	temporarily	.....	.....
60-62 Blend 437 e.p.	discontinued	.....	.....
OKLAHOMA			
64-66 Blend 437 e.p.	†5.75 – 6.00	†5.75 – 6.00	†5.75 – 6.00

BURNING OILS

PENNSYLVANIA			
45 w.w. kerosene	6.25 – 6.50	6.25 – 6.50	6.25 – 6.50
46 w.w. kerosene	6.50 – 6.75	6.50 – 6.75	6.50 – 6.75
47 w.w. kerosene	7.00 – 7.25	7.00 – 7.25	7.00 – 7.25
300 mineral seal	7.25 – 7.50	7.25 – 7.50	.....
OKLAHOMA			
41-43 w.w. kerosene	4.125– 4.25	4.125– 4.25	4.125– 4.25
42-44 w.w. kerosene	4.50 – 4.625	4.50 – 4.625	4.50 – 4.625
KANSAS (F. O. B. refinery Kansas destination)			
41-43 w.w. kerosene	4.75 – 5.00	4.75 – 5.00	4.50 – 5.00
42-44 w.w. kerosene	5.50 – 5.625	5 50 – 5.625	5.50 – 5.625
NORTH TEXAS			
40-42 w.w. kerosene	†4.125	†4.125	†4.125
41-43 w.w. kerosene	†4.375	†4.375	†4.375
NORTH LOUISIANA (N. La., Ark. and Miss. destination)			
41-43 w.w. kerosene	4.75 – 5.00	4.75 – 5.00	4.75 – 5.00
ARKANSAS (Arkansas destination only)			
42-44 kerosene	4.75 – 5.00	4.75 – 5.00	4.75 – 5.00
CALIFORNIA			
38-40 w.w. kerosene	5.00 – 5.50	5.00 – 5.50	5.00 – 5.50

NEUTRAL OIL

PENNSYLVANIA Vis.	(Viscosity at 70°F.)		
200 No. 3 Assoc. Filt.	33.00 –34.00	33.00 –34.00	33.00 –34.00
180 No. 3 Assoc, Filt.	30.00 –32.00	30.00 – 32.00	30.00 –32.00
150 No. 3 Assoc. Filt.	27.00	27.00	27.00
	(Non Viscous)		
34 Grav. 330-340 Flash	7.25 – 7.75	7.25 – 7.75	7.25 – 7.75
36 Min. Neut. 300-305 Flash	6.50 – 7.00	6.50 – 7.00	6.50 – 7.00
OKLAHOMA Vis. Color	(Viscosity at 100°F.)		
100—No. 2	6.00 – 6.50	6.00 – 6.50	6.00 – 6.50
150—No. 3	8.00 – 8.60	8.00 – 8.50	8.00 – 8.50
150—No. 4	8.00 – 8.50	8.00 – 8.50	8.00 – 8.50
180—No. 3	9.00 –10.00	9.00 –10.00	9.00 –10.00
180—No. 4	9.50 – 9.75	9.50 – 9.75	9.50 – 9.75
180—No. 5	9.25 – 9.75	9.25 – 9.75	9.25 – 9.75
200—No. 3	9.50 –11.00	9.50 –11.00	9.50 –11.00
200—No. 4	9.50 –10.75	9.50 –10.75	9.50 –10.75
200—No. 5	8.50 –10.50	8.50 –10.50	8.50 –10.50
220—No. 3	12.50 –13.50	12.50 –13.50	12.50 –13.50
220—No. 4	12.25 –12.50	12.25 –12.50	12.25 –12.50
220—No. 5	11.50 –12.00	11.50 –12.00	11.50 –12.00
240—No. 3	13.50 –14.00	13.50 –14.00	13.50 –14.00
240—No. 4	13.25 –13.50	13.25 –13.50	13.25 –13.50
240—No. 5	12.00 –13.00	12.00 –13.00	12.00 –13.00
280—No. 3	15.50 –16.50	15.50 –16.50	15.50 –16.50
280—No. 4	15.25	15.25	15.25
280—No. 5	14.00 –15.00	14.00 –15.00	14.00 –15.00
300—No. 5-6	17.00	17.00	17.00
GULF COASTAL Vis. Color	(Viscosity at 100°F., pour test 0)		
100—No. 2 Unfilt. Pale	6.75 – 7.25	6.75 – 7.25	6.75 – 7.25
200—No. 3 Unfilt. Pale	9.25 –10.00	9.25 –10.00	9.25 –10.00
300—No. 3 Unfilt. Pale	10.25 –11.00	10.25 –11.00	10.25 –11.00
500—No. 3½ Unfilt. Pale	11.25 –12.00	12.25 –13.00	12.25 –13.00
750—No. 4 Unfilt. Pale	13.25 –14.00	14.25 –15.00	14.25 –15.00
200—No. 5½ Red Oil	7.25 – 8.00	7.25 – 8.00	7.25 – 8.00
300—No. 5½ Red Oil	8.25 – 9.00	8.25 – 9.00	8.25 – 9.00
500—No. 6 Red Oil	9.75 –10.50	9.75 –10.50	9.75 –10.50
750—No. 6 Red Oil	12.25 –13.00	12.25 –13.00	12.25 –13.00
CALIFORNIA Vis. Color	(Viscosity at 100°F.)		
100—No. 3	9.50 –10.00	9.50 –10.00	9.50 –10.00
200—No. 3	11.50 –12.00	11.50 –12.00	11.50 –12.00
300—No. 3	13.00 –13.50	13.00 –13.50	13.00 –13.50
450—No. 3	15.50 –16.00	15.50 –16.00	15.50 –16.00
550—No. 3	16.50 –17.00	16.50 –17.00	16.50 –17.00
600—No. 3	17.00 –17.50	17.00 –17.50	17.00 –17.50
200—No. 5	11.00 –11.50	11.00 –11.50	11.00 –11.50
300—No. 5	12.00 –12.50	12.00 –12.50	12.00 –12.50
400—No. 5	14.00 –14.50	14.00 –14.50	14.00 –14 50
500—No. 5	15.00 –15.50	15.00 –15.50	15 00 –15.50
600—No. 5	16.00 –16.50	16.00 –16.50	16.00 –16.50
700—No. 7	18.00 –18.50	18.00 –18.50	18.00 –18.50

CYLINDER STOCKS

OKLAHOMA			
190-200 Vis. at 210° Brt. St.	31.00 –32.00	31.00 –32.00	31.00 –32.00
150-160 Vis. at 210° Brt. St.	22.00 –25.00	22.00 –25.00	22.00 –25.00
600 E St. 140-150 Vis.-210°	17.00 –18.00	17.00 –18.00	17.00 –18.00
600 St. Ref. Olive Green	8.50 –10.00	8.50 –10.00	8.50 –10.00
600 St. Ref. Dark Green	6.75 – 8.00	6.75 – 8.00	6.75 – 8.00
Black Oil	5.00	5.00	5.00
PENNSYLVANIA	(1-inch Immersion Test)		
600 Steam Refined	9.00 –10.50	9.00 –10.50	9.00 –10.50
650 Steam Refined	11.25 –12.25	11.25 –12.25	11.25 –12.25
600 Flash	16.00 –16.50	16.00 –16.50	16.00 –16.50
625 Flash	26.00 –27.00	26.00 –27.00	26.00 –27.00
600 Warren E	16.50 –17.00	16.50 –17.00	16.50 –17.00
600 Oil City E	15.00 –16.00	15.00 –16.00	15.00 –16.00
600 D Filtered	24.50 –25.50	24.50 –25.50	24.50 –25.50
Cold Test Stock, 40-50 p. p., 140-150 vis. at 210°, 540-550 flash, No. 8 color	28.00 –30.00	28.00 –30.00	28.00 –30.00
40-50 p.p., 140-150 vis. at 210, 540-550 flash, No. 6-6½ color diluted	26.00 –28.00	26.00 –28.00	26.00 –28.00
††Extra low cold test stock 15 p.p., 155-160 vis. at 210, 545 flash, No. 6½ color	37.00	37.00	37.00

(Note—Prices of total immersion test goods average 1 to 3 cents per gallon higher)

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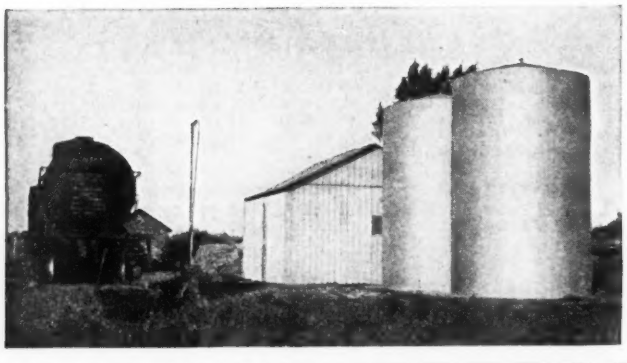

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Refinery Markets on Wax and Heavy Oil Products

Prices given below are in cents per gallon, F. O. B. refinery, except where $ is shown

(For quick reference to Refinery Prices, get the OIL PRICE HANDBOOK, published annually)

WAX

PENNSYLVANIA	Prices Feb. 27	Prices Feb. 20	Prices Feb. 13
Per Pound, New York			
122-124 white crude scale	3.125– 3.25	3.125– 3.25	3.25
124-126 white crude scale	3.125– 3.25	3.125– 3.25	3.25
**OKLAHOMA			
124-126 White Crude Scale	3.125– 3.25	3.125– 3.25	3.125– 3.25
CALIFORNIA			
White crude scale, per pound, ton lots	6.00 – 6.50	6.00 – 6.50	6.00 – 6.50

FUEL OIL

PENNSYLVANIA			
36-40 fuel oil	5.00 – 5.25	5.00 – 5.25	4.75 – 5.125
30-34 fuel oil	4.875– 5.125	4.875– 5.125	4.75 – 5.00
28-32 fuel oil	4.875– 5.125	4.875– 5.125	4.75 – 5.00
OKLAHOMA			
38-40 straw distillate	3.00 – 3.375	3.00 – 3.375	3.25 – 3.375
36-38 straw distillate	3.00 – 3.125	3.00 – 3.125	3.00 – 3.125
32-36 gas oil, straw	†2.50 – 2.625	†2.625– 2.75	†2.625– 2.75
32-36 dark gas oil	2.50	2.50	2.50
28-30 fuel oil (in bbls.)	$0.95 – 1.00	$0.925– 0.975	$0.925– 0.975
26-28 fuel oil (in bbls.)	$0.90 – 0.925	$0.90	$0.85 – 0.90
24-26 fuel oil (in bbls.)	**$0.875	**$0.875	**$0.825–0.85
22-26 fuel oil (in bbls.)	**$0.85– 0.875	**$0.85 –0.875	**$0.80– 0.825
18-22 fuel oil (in bbls.)	**$0.80– 0.825	**$0.80 –0.825	**$0.775
16-18 fuel oil (in bbls.)	**$0.75– 0.775	**$0.75 –0.775	**$0.75
14-16 fuel oil (in bbls.)	**$0.75– 0.775	**$0.75 –0.775	**$0.75

Note: Zero cold test low flash gas oils sell for ¼ cent more per gallon. Zero cold test fuel oils sell for 5 to 15 cents more per bbl.

KANSAS *(F. O. B. refinery Kansas destination.)			
38-40 straw distillate	3.50	3.50 – 3.75	3.50 – 3.75
36-38 straw distillate	3.25	3.25	3.25
32-36 gas oil	2.75 – 2.875	2.75 – 2.875	2.75 – 2.875
24-26 fuel oil	$0.90 – 1.00	*$0.90– 1.00	*$0.90 – 1.00
18-22 fuel oil	*$0.85	*$0.85	*$0.85
NORTH TEXAS			
38-40 straw distillate	3.25 – 3.375	3.25 – 3.375	3.25 – 3.375
32-36 gas oil, cracked	2.25 – 2.375	2.25 – 2.375	2.25 – 2.375
32-36 gas oil, uncracked	2.25 – 2.375	2.25 – 2.375	2.25 – 2.375
24-26 fuel oil (in bbls.)	$0.725– 0.75	$0.725– 0.75	$0.725– 0.75

GULF COASTAL	Prices Feb. 27	Prices Feb. 20	Prices Feb. 13
Fuel (in bbls.)	$1.40 –$1.50	$1.40 –$1.50	$1.40 –$1.50
Gas oil	4.375– 4.50	4.375– 4.50	4.375– 4.50
NORTH LOUISIANA (N. La., Ark. and Miss. destination)			
32-36 gas oil, dark	3.00 – 3.125	3.00 – 3.125	3.00 – 3.125
32-36 gas oil, straw	3.125– 3.25	3.125– 3.25	3.125– 3.25
16-20 fuel oil (in bbls.)	$1.00	$1.00	$1.00
ARKANSAS (Arkansas destination only)			
32-36 gas oil, straw	3.25 – 3.50	3.25 – 3.50	3.25 – 3.50
32-36 gas oil	3.00	3.00	3.00
28-32 gas oil	2.75	2.75	2.75
CALIFORNIA (F. O. B. San Joaquin Valley. At San Francisco, 4c per bbl. more)			
14-18 fuel oil (in bbls.)	$0.60 –$0.75	$0.60 –$0.75	$0.60 –$0.75
14-18 Bunker oil (in bbls.)	$0.80 –$1.00	$0.80 –$1.00	$0.80 –$1.00
30-34 gas oil	$1.05 –$1.10	$1.05 –$1.10	$1.05 –$1.10
27 Plus Diesel oil (in bbls.)	$0.90 –$1.00	$0.90 –$1.00	$0.90 –$1.00

PETROLATUMS

PENNSYLVANIA (In cents per pound in tank cars; in barrels, in car lots ¾c per pound more.)			
Snow White	8.875	8.875	8.875
Lily White	7.875	7.875	7.875
Cream White	6.875	6.875	6.875
Light Amber	3.875	3.875	3.875
Amber	3.50	3.50	3.50
Red	3.25	3.25	3.25
Green No. 5 color	2.625	2.625	2.625

**PETROLEUM COKE

OKLAHOMA (Per ton in car lots)			
Lump	$5	$5	$5
Still run	$3	$3	$3
Breeze	$2	$2	$2

†PRICES NOMINAL ††ONLY ONE REFINER QUOTING *QUOTATIONS ONLY **REPRESENTS BOTH SALES AND QUOTATIONS

Signing of New Natural Gasoline Contracts Brings Higher Spot Market

Staff Special

LOS ANGELES, Feb. 25

NATURAL gasoline spot sales in California were steady at 8 to 8.50 cents a gallon against a low of 6.50 cents two weeks ago. Several small sales were reported at the new prices, and several contracts extending over a period were also signed the past few days, at 10 cents under the service station price, without tax. The high spot market is caused by the signing of the new contracts, leaving little free natural gasoline in the hands of the independents to be moved hand to mouth. The major companies hold most of the stocks.

There is no actual change in the gasoline export market, with reports current of sales at 6.125 to 6.25 cents a gallon. It is also understood that under certain circumstances that some gasoline can be purchased in this trade at 6 cents, but it is not considered that this low figure is the market. The major companies claim that around 6.25 cents is the market, and that U. S. Motor can be shipped to East coast at this price and successfully compete with other gasolines. Pan American booked order for one cargo of U. S. Motor this week for East coast shipment and rumors were current that the same company booked orders for two other cargoes. It was not known the price this business commanded.

The gasoline tank car market is unchanged, although quotations are slightly revised. Some gasoline is moving out of Los Angeles territory to points outside the state at 7 cents, but quite a little gasoline is also moving at the same time to similar points at 7.50 cents. Most of the tank car motor fuel moving to points within the state is being sold at 8 to 8.50 cents, without tax.

Fuel oil export prices are around $0.72 and up. It was mentioned in these columns two weeks of the sale by the Shell Co. of 200,000 barrels of fuel to Japanese navy, and recently Associated sold 400,000 barrels to same buyers. These sales are reported to be about $0.72 net to the sellers. Fuel oil in tank cars is moving in fair volume at old prices.

Lubricants went up some three weeks ago in California and sellers report that they are having no trouble in obtaining the new price list, due to improved quality of most of the lubes being sold. All of the smaller marketers followed with higher prices. Eastern lubes, especially the highly advertised brands, find a satisfactory sale in California.

The gasoline price situation in Arizona is showing no real improvement. The major company owned stations hold to the posted price of 27 cents, but a number of independently owned stations are still selling at 3 cents under the major companies. The new marketing company serving these cut price stations is fighting a hard fight, but its profits are not large.

* * *

Los Angeles Shipments

LOS ANGELES, Feb. 24.—Shipments of petroleum products out of Los Angeles harbor week ended Feb. 18 to points outside of Pacific coast trade territory totaled 742,467 barrels or a daily average movement of 106,067 barrels. Previous week's total movement was 1,331,424 barrels, or a daily average of 190,203 barrels.

Of last week's shipments, Pacific foreign ports drew 5431 barrels of tops, 250,325 barrels of fuel, 90,186 barrels of kerosene and 15,047 barrels of gasoline. Movement to Atlantic domestic included 86,007 barrels of crude, 96,612 distillates and 77,580 barrels of gasoline. Two cargoes of gasoline, 125,279 barrels, went to Atlantic foreign.

Chicago Gasolines Strengthen With Fuels Hard to Obtain

Staff Special
CHICAGO, Feb. 25

FUEL oils and gasolines continued to hold the spotlight in the Chicago market this week. Practically all grades of fuel oils were still hard to obtain and most refiners continue to report "sold up" on the commodity; some for the next 30 days. The week's market feature was the revision in Mid-Continent crude. Opinions differed as to the effect of the revision but the consensus was that it gave a firmer tone to gasoline but had no effect on fuel oils.

The gasoline market continued to gain strength this week. Refiners and marketers reported less difficulty in selling 58-60 U. S. Motor gasoline at 6.125 to 6.25 cents and by Saturday practically all companies that had been moving gasoline at 6 cents raised their prices.

Considerable discussion was caused by the Illinois Supreme court's action in killing the gasoline tax. It had no apparent general effect on the Illinois market, the trade reported. One refiner reported increased orders from several jobbers doing business near the Illinois state lines. He said they were anticipating an additional patronage from without the state since the gasoline tax was eliminated.

Demand for the higher gravities of gasoline was fairly good. Several sellers reported better demand for 60-62, 437 and 60-62, 400 e.p. gasolines than for U. S. Motor grade. The 60-62, 437 e.p. moved all week at 6.125 to 6.25 cents, with sales also reported at 6.375 cents. Gasoline of 60-62, 400 e.p. sold at generally unchanged price of 6.50 to 6.625 cents. Bulk of 64-66, 375 e.p. gasoline continued to move at 7 cents flat. However, sales were reported at 6.875 to 7.125 cents.

Kerosene was in good demand in several quarters this week. Most of the trade, however, reported little business on the commodity. Sales of 41-43 w.w. kerosene continued mostly at 4.25 cents.

Distillate demand was unchanged over last week and prices of 38-40 straw were also the same. Majority of sales were made at 3.25 to 3.375 cents, with some reported at 3.125.

Gas oils have been in good demand. Several of the trade reported the ordinary grades were obtained somewhat freer and prices were fractionally lower. The 32-36 ordinary dark gas oil opened the week at 2.625 to 2.75 cents and remained at those figures until Thursday, when most of the sales were at 2.50 to 2.75 cents. Dark zero 32-36 gas oil continued to sell at 2.875 to 3 cents. The 32-36 straw zero gas oil opened the week fractionally lower in price. The majority of sales were made at 3 to 3.25 cents all week.

Fuel oil prices were generally unchanged throughout the week. Sales continued at the high levels established last week. One local refiner who has been sold up for the past month reported having a small amount of goods to move on the spot market. The 28-30 fuel oil sold at $1.00 to $1.10. Fuel of 24-26 and 22-26 gravity sold at $0.85 to $0.925. Ordinary 18-22 fuel sold at $0.825 to $0.85 during the week after opening at $0.80 to $0.85 on Monday. Low cold test 18-22 fuel continued to move around $0.90 to $0.925.

Smackover treated crude fuel moved at a wide variation of prices during the week but the market apparently was more settled by Saturday. Sales were reported at $0.90 to $1.00 on Monday; $0.95 to $1.00 Tuesday, Wednesday and Thursday, and at $0.95 to $0.975 Friday and Saturday.

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Week's Price Changes Tank Wagon Markets

Gasoline Changes

Standard of Kentucky—T. w. price gasoline advanced 2 cents, s.s. price 3 cents, Atlanta, to 18 cents and 21 cents respectively, including 4 cent state tax, **Feb. 13.**

T. w. price advanced 6 cents, s. s. price 3 cents, Macon, both to 19 cents, including tax, **Feb. 13.**

T. w. cut 1 cent, s. s. 3 cents, Miami, to 19 cents and 20 cents respectively, including 5 cent state tax, **Feb. 15.**

Standard of Indiana—Gasoline prices reduced 2 cents, Illinois, account elimination state tax which was declared unconstitutional, **Feb. 25.** All points at which prices are published in the tank wagon table in NATIONAL PETROLEUM NEWS were reduced the full 2 cents, except Decatur, where reduction was 1.3 cents off the prices which included tax. Prices at Decatur had been somewhat below normal.

T. w. price advanced 2.2 cents, s. s. advanced 4.2 cents, Peoria, to 16.2 cents and 18.2 cents respectively, including 2 cent state tax, **Feb. 21.** With the 2 cent cut on Feb. 25, prices became 14.2 cents and 16.2 cents respectively.

S. s. price only advanced 1 cent, Minneapolis, to 16 cents, **Feb. 21.** T. w. unchanged at 15 cents.

T. W. and s. s. prices reduced 3/10 cent, Bartlesville, to 15.5 cents and 17.5 cents respectively, including 3 cent state tax, due to reduction in freight rates, **Feb. 21.**

T. w. and s. s. prices gasoline advanced 2 cents, Detroit, to 17.8 cents and 19.8 cents respectively, including 3 cent state tax, **Feb. 27.**

Atlantic Refining—T. w. and s. s. prices gasoline advanced 2 cents New Haven, both to 20 cents, including 2 cent state tax, and Hartford advanced 3 cents, to 21 cents both t. w. and s. s., Sunday, **Feb. 26.**

Magnolia Petroleum—T. w. and s. s. prices gasoline advanced 1 cent, Oklahoma and Arkansas, **Feb. 27.**—Oklahoma t. w. price became 14 cents generally, including 3 cent state tax.

S.s. price gasoline reduced 2 cents, Fort Smith, to 17 cents, including Arkansas tax of 3 cents, Feb. 24. T.w. and s.s. prices gasoline advanced 2 cents, Tulsa, to 15 cents and 16 cents respectively, including 3 cent state tax, **Feb. 24.**

Kerosene Changes

Standard of Kentucky—Kerosene advanced 2½ cents at Atlanta, and 3 cents, at Macon, both to 16.5 cents t. w., on **Feb. 13.**

Standard of Indiana—Kerosene reduced 3/10 cent, Bartlesville, to 10.5 cents t. w. **Feb. 21.**

Magnolia Petroleum—Kerosene advanced 1 cent, Oklahoma, making t. w. price 11 cents generally, **Feb. 27.**

Kerosene advanced 1 cent, Fort Worth, to 11 cents t.w., **Feb. 20.**

Continental Oil—Kerosene advanced 2 cents, Denver, to 14.5 cents t.w., **Feb. 27.**

Tank Wagon, Service Station Markets for Gasoline and Kerosene In United States Territories and Canada

(As posted by principal marketing companies)

(OIL PRICE HANDBOOK has t.w. and s.s. markets for whole year arranged for quick reference)

These Prices In Effect February 27, 1928

S.O. NEW JERSEY TERRITORY

	Gasoline T.W.	Tax	Total T.W.	S.S.	Oil T.W.
Atlantic City, N. J.	16	2	18	20	14
Newark, N. J.	16	2	18	20	14
Annapolis, Md.	16	4	20	23	12
Baltimore, Md.	16	4	20	23	10
Cumberland, Md.	16	4	20	23	14
Washington, D. C.	16	2	18	21	12
Danville, Va.	16	4½	20.5	*	14
Norfolk, Va.	16	4½	20.5	23.5	12
Richmond, Va.	14	4½	18.5	21.5	14
Roanoke, Va.	16	4½	20.5	23.5	14
Petersburg, Va.	16	4½	20.5	23.5	14
Charleston, W. Va.	16	4	20	23	14
Keyser, W. Va.	16	4	20	23	14
Parkersburg, W. Va.	14	4	18	21	14
Wheeling, W. Va.	16	4	20	23	14
Charlotte, N. C.	16	4	20	23	14
Hickory, N. C.	16	4	20	20	14
Mt. Airy, N. C.	16	4	20	23	14
Salisbury, N. C.	16	4	20	23	14
Charleston, S. C.	15	5	20	23	14
Columbia, S. C.	15	5	20	23	14

*Dealers set own prices. S. O. New Jersey does not operate station.

Note: Above gasoline and oil prices in N. Carolina include ¼c per gal. inspection fee and in S. Carolina ½c on both.

S. O. NEW YORK

Due to local price conditions at many points in S. O. New York territory, actual prices on both gasoline and kerosene are being made at under the posted tank wagon prices published below.

New York City	17	0	17	21	15
Albany, N. Y.	13	0	13	15	15
Buffalo, N. Y.	13	0	13	16	14
†Rochester, N. Y.	13	0	13	16	12
Syracuse, N. Y.	15	0	15	15	15
Boston, Mass.	17	0	17	15	15
Augusta, Me.	17	4	21	21	15
Manchester, N. H.	17	4	21	23	15
Burlington, Vt.	17	3	20	22	15

†It is reported that S. O. New York is selling a second grade of gasoline at Rochester, 3c below the above posted prices which apply on its Socony grade.

ATLANTIC REFINING

Pittsburgh, Pa.	16	*	16	*22	13
Philadelphia, Pa.	15	*	15	*21	13
Allentown, Pa.	16	*	16	*22	13
Erie, Pa.	12	*	12	*18	13
Scranton, Pa.	16	*	16	*22	13
Altoona, Pa.	16	*	16	*22	13
Dover, Del.	16	3	19	22	13
Wilmington, Del.	16	3	19	22	12
Providence, R. I.	15	2	17	17	15
Boston, Mass.	15	0	15	15	15
Springfield, Mass.	16	0	16	16	15
Worcester, Mass.	15	0	15	15	15
Hartford, Conn.	19	2	21	21	15
New Haven, Conn.	18	2	20	20	15

*3-cent state tax is collected by retail dealer and paid by him directly to state.

S. O. KENTUCKY

Lexington, Ky.	13	5	18	21	15.5
Louisville, Ky.	13	5	18	21	15
Covington, Ky.	14	5	19	22	15.5
Clarksdale, Miss.	13	4	17	20	11.5
Gulfport, Miss.	††14.5	4	††18.5	21.5	14
Jackson, Miss.	13	4	17	20	12
Natchez, Miss.	12 5	4	16.5	19.5	14
Vicksburg, Miss.	12.5	4	16.5	19.5	14
Birmingham, Ala.‡	13	4	17	18	14.5
Mobile, Ala.‡	14	4	18	21	14
Montgomery, Ala.*‡	9	4	13	16	15 5
Atlanta, Ga.	14	4	18	21	†16.5
Augusta, Ga.	14	4	18	20	†16.5
Macon, Ga.	15	4	19	19	†16 5
Savannah, Ga.	13	4	17	19	†14.5
Jacksonville, Fla.°	12	5	17	18	13.5
Miami, Fla.°	14	5	19	20	14.5
Tampa, Fla.°	13	5	18	21	13
Pensacola, Fla.°	**14	5	**19	22	13

*Local privilege tax of 1 cent on gasoline and ½ cent on kerosene at Montgomery included.

‡Alabama gasoline prices include 1/40 of 1c inspection fee. Mobile gasoline prices include 1c city tax.

†Georgia kerosene prices include 1c state tax.

°Florida gasoline prices include ½c inspection fee.

**Both tank wagon prices include 1c city tax at Pensacola, which went into effect Oct. 15, 1926.

††Both tank wagon prices at Gulfport include Harrison county privilege tax of 2c.

S. O. INDIANA

	Gasoline T.W.	Tax	Total T.W.	S.S.	Oil T.W.
Chicago, Ill.	14	0	14	16	12
Decatur, Ill.	14.2	0	14.2	16.2	12.1
E. St. Louis, Ill.	13.1	0	13 1	15.35	11.2
Joliet, Ill.	14.4	0	14.4	16.4	12.3
Peoria, Ill.	14.2	0	14.2	16.2	12.1
Quincy, Ill.	14.2	0	14.2	16.2	11.9
Indianapolis, Ind.	12.2	3	15.2	16.2	13.2
Evansville, Ind.	14	3	17	19	13
South Bend, Ind.	14.4	3	17.4	17.4	13.4
Detroit, Mich.	14 8	3	17 8	19.8	13.7
Grand Rapids, Mich.	14.7	3	17.7	19.7	13.6
Saginaw, Mich.	14.9	3	17.9	19.9	13.8
Green Bay, Wis.	14.6	2	16.6	18.6	12.4
Madison, Wis.	14.3	2	16.3	18.3	12.1
Milwaukee, Wis.	14.1	2	16.1	18.1	11.9
La Crosse, Wis.	15.2	2	17 2	19.2	13
Minneapolis, Minn.	13	2	15	16	12.9
Duluth, Minn.	13.5	2	15.5	17.5	12.9
Mankato, Minn.	12.1	2	14 1	16.1	12.7
Des Moines, Ia.	12.9	3	15 9	17.9	12.3
Davenport, Ia.	12.5	3	15.5	17.5	12.3
Sioux City, Ia.	14.1	3	17.1	19 1	11.9
Mason City, Ia.	14.5	3	17.5	19 5	12.3
St. Louis, Mo.	*13.6	2	15.6	17.9	11.3
Kansas City, Mo.	†12.9	2	14.9	16.9	10.6
St. Joseph, Mo.	†12.5	2	14.5	16.5	11.2
Fargo, N. D.	13	2	15	17	14.9
Grand Forks, N. D.	17.2	2	19.2	21.2	15.2
Minot, N. D.	16.9	2	18.9	20.9	14.9
Pierre, S. D.	15.5	4	19.5	21.5	13.9
Huron, S. D.	15.5	4	19.5	21.5	13.9
Wichita, Kans.	12.8	2	14.8	16 8	10.8
Bartlesville, Okla.	12.5	3	15.5	17.5	10.5

S. O. Indiana's quantity discount schedule on tank wagon deliveries of gasoline outside the city of Chicago is 1c for 50 gals. or more at one delivery; 1½c for 6,000 gals. or more a month; 2c for 10,000 gals. or more a month, and 3c for 15,000 gals. or more a month.

In Chicago, above discounts apply, except that minimum required quantity to get the 1c discount is 100 gals., instead of 50 gals. This 1c discount applies on quantities of 100 gals. and over, in addition to regular Q.D.A. discounts applying thru rest of territory, as stated above.

Service station discount is 2c per gal. to consumers of 200 gals. or more a month, or 2400 gals. per year.

Discount on kerosene is 1c on 50 gal. dumps throughout territory.

*Includes city tax of ½c.

†Includes city tax of 1c.

S. O. NEBRASKA

Omaha, Neb.	15.25	2	17.25	17.25	12.25
McCook	12.75	2	14.75	16.75	11.50
Norfolk	14.75	2	16.75	18.75	12.75
North Platte	15.75	2	17.75	18.5	13.50
Scottsbluff	15.25	2	17.25	19.25	13.00

CONTINENTAL OIL

Denver, Colo.	13	3	16	18	14.5
Pueblo, Colo.	13	3	16	18	14.5
Grand Junction, Colo.	17.5	3	20.5	22.5	18
Casper, Wyo.	14	3	17	19	13
Cheyenne, Wyo.	15	3	18	20	14.5
Butte, Mont.	19.5	3	22.5	22.5	19
Helena, Mont.	19.5	3	22.5	24.5	19
Salt Lake City, Utah	16.5	3½	20	21	17
Boise, Ida.	19.5	4	23.5	25.5	19
Twin Falls, Ida.	19.5	4	23.5	25.5	19
Albuquerque, N. M.	16	5	21	24	17

S. O. CALIFORNIA*

Phoenix, Ariz.	19	4	23	27	21.5
Los Angeles, Cal.	13.5	3	16.5	20.5	15.5
Fresno, Cal.	14	3	17	21	16.5
San Francisco, Cal.	14	3	17	21	15.5
Reno, Nev.	18	4	22	26	19
Portland, Ore.	14.5	3	17.5	21.5	16.5
Seattle, Wash.	14.5	2	16.5	20.5	16.5
Spokane, Wash.	18.5	2	20.5	24.5	20.5
Tacoma, Wash.	14.5	2	16.5	20.5	16.5

*On Oct. 1, t.w. price at all points for spot sales, was advanced 1c. Very large portion of deliveries are under contract carrying above prices. New customers signing contracts and selling only one brand of gasoline, are given prices published in above table.

S. O. LOUISIANA

Little Rock, Ark.	11	5	16	16	11
Alexandria, La.	13	2	15	18	†14
Baton Rouge, La.	12	2	14	17	†12.5
Lake Charles, La.	13.5	2	15.5	18.5	†14
New Orleans, La.	13.5	2	*15.5	*18.5	†14
Shreveport, La.	13.5	2	15.5	18.5	†13
Lafayette, La.	13	2	15	18	†13.5
Bristol, Tenn.	16	3	19	22	14
Chattanooga, Tenn.	16.5	3	19.5	22.5	15
Knoxville, Tenn.	16.5	3	19.5	22.5	15
Nashville, Tenn.	15	3	18	21	15
Memphis, Tenn.	14	3	17	18.5	14

*New Orleans gasoline prices include 1c parish tax in addition to 2c state tax, and kerosene prices include 1c state tax and 1c parish tax.

†Kerosene price in Louisiana includes 1c state tax

S. O. OHIO

	Gasoline T.W.	Tax	Total T.W.	S.S.	Oil T.W
All Ohio points	14	3	17	19	14

MAGNOLIA PETROLEUM

Muskogee, Okla.	11	3	14	17	11
Oklahoma City	11	3	14	15	11
Tulsa, Okla.	11	3	15	16	11
Fort Smith, Ark.*	14	*3	17	17	10
Little Rock, Ark.	12	5	17	17	11
Texarkana, Ark. *	13	*3	16	19	12
Dallas, Tex.	9	3	12	15	11
Fort Worth, Tex.	11	3	14	16	11
Houston, Tex.	10	3	13	15	1:
San Antonio, Tex.	10	3	13	15	1(
El Paso, Tex.	11	3	14	15	16

*Within City of Texarkana and Fort Smith, the state tax on gasoline is 3c per gal. conforming with the Texas state tax. In these two districts outside of the city the 5c Arkansas tax applies.

V. M. & P. NAPHTHA

(Changes ordinarily occur coincident with gasoline price changes)

	Oleum Spirits	V.M. & P. Naphtha	Cleaner Naphtha
Chicago	14.7	16.2	.3
Detroit	16.4	17.9	19.7
Kansas City	†14.9	†16.4	†18.2
Milwaukee	15.4	*18.9	*20.7
Minneapolis	*18.7	*20.2	*22
St. Louis	14.6	16.1	17.9
New York	...	}*	

Note: Above prices on Oleum Spirits and V. M. & P. Naphthas went into effect January 3, 1928.

*Includes 2c state tax.

†Includes 1c city tax.

CANADA

(Per Imperial Gallon, which is 1.2 American Gallons)

ONTARIO

	Gasoline T.W.	Tax	Total T.W.	S.S	Oil T.W
Toronto	19.5	3	22.5	26	21
Ottawa	19.5	3	22.5	26	21
Cochrane	24.5	3	27.5	36	26
Ft. William	24.5	3	27.5	31	23 5

MANITOBA

Winnipeg	24.5	3	27.5	31	23 5

SASKATCHEWAN

Regina	27.5	0	27.5	32	26 5

ALBERTA

Edmonton	26.5	3	29.5	33	25 5
Calgary	22.5	3	25.5	29	23 5

BRITISH COLUMBIA

Vancouver	21	3	24	28	22

QUEBEC

Montreal	20.5	3	23.5	27	21
Quebec City	22.5	3	25.5	31	23
Three Rivers	22.5	3	25.5	29	23

NEW BRUNSWICK

St. John	24.5	3	27.5	32	24
Moncton	24.5	3	27.5	32	24

NOVA SCOTIA

Halifax	24.5	3	27.5	32	24
Sydney	24.5	3	27.5	32	24

PRINCE EDWARD ISLAND

Charlottetown	24.5	3	27.5	31	24

Note: In districts surrounding these points 1c additional is added to city price.

Gasoline Movement Improves, Seaboard Prices Steadier

Staff Special
NEW YORK, Feb. 25

GASOLINE movement improved slightly in eastern seaboard markets the past week. This, coupled with price changes for crude oil with high gasoline yield resulted in a much better feeling about conditions in general among the trade in New York. Prices in most parts of the seaboard assumed a steadier tone, and in one or two instances advanced 0.25 cent.

Heavier burning oils in most seaboard districts were generally unchanged, although some exceptionally low priced offers were reported in the New England area.

U. S. Motor gasoline in New York harbor at 7.75 cents loomed as a more disturbing factor early in the week. The fact, however, that jobbers were quick to snap up offers at this price led a good many of the trade to believe that gasoline available at less than 8 cents recently has been more "talk" than anything else.

The holiday broke in on trading the middle of the week. On returning to business Thursday the news of crude price revisions was generally known, and a majority of gasoline sellers were firmer in their quotations. By the end of the week, it was doubtful if more than occasional cars of U. S. Motor could be picked up in New York harbor at less than 8 cents a gallon.

In the New England refinery markets, prices at the new levels put in effect recently were reported fairly well maintained. Most sellers, however, admitted they were getting little business on the basis of the 10-cent delivered price but explained this as due to jobbers in this area being rather heavily stocked with gasoline purchased before refinery prices advanced.

Prices for both ordinary U. S. Motor and the California grade were generally unchanged at Philadelphia and Baltimore. Goods which was available in western Pennsylvania at 7.50 cents recently had little effect on the market for U. S. Motor at these seaboard points although refiners asserted their sales had dropped slightly as a result. U. S. Motor gasoline was quoted at 8 to 8.25 cents at both points, while prices for the California grade at Baltimore remained 0.25 cent higher at Baltimore than at Philadelphia. Baltimore sellers reported orders from south of Altoona, Pa., at the present time were sufficient so that they were not forced to meet the competitive price from Philadelphia for business north of this point.

Jacksonville and Savannah markets felt the effect of revision in crude prices more than did northern seaboard markets. The higher prices for U. S. Motor gasoline in north Texas also are more favorable to these two terminal markets. U. S. Motor was quoted at a minimum of 7.75 cents at Jacksonville whereas goods was available 0.25 cent lower a week ago. One or two sellers also were asking 8 cents at Savannah against 7.75 cents a week ago.

Kerosene prices representing the quotations of a majority of sellers were unchanged in all markets except at New York. Water white kerosene was largely quoted at 7 cents at New York, although one large company continued to ask 7.50 cents. This grade was available at Philadelphia at 6.75 cents with one refiner asking 7 cents and at Baltimore a minimum of 7.25 cents was quoted.

Reductions in prices for gas oil and furnace oil by one large company in the New York market early in the week narrowed the price ranges for these commodities. Furnace oil, 38-42 gravity, at New York harbor was largely quoted at 5.75 cents a gallon in tank cars and 28-34 gravity gas oil was available at 4.50 to 4.75 cents. In the Boston district, several sales of 36-40 furnace oil were reported at as low as 5.25 cents. On the other hand a number of sellers were moving goods at as high as 5.75 cents.

Low price sales of Grade C bunker oil in cargoes for export were reported in northern seaboard markets, but tank car prices remained unchanged.

Foreign Buyers Are Disinterested, Over-Seas Stocks Low

Staff Special
NEW YORK, Feb. 25

GULF export markets were featureless the past week. Foreign buyers showed no disposition to build up their stocks which, according to advices from abroad, are touching rock bottom, and generally speaking the market was devoid of any interest whatever.

There was a feeling among the trade in New York that the upward revision in prices for high gravity Mid-Continent crude, which in turn affects prices for 64-66, 375 end point gasoline, would bring at least a temporary period of active buying. But so far as is known this did not develop.

Gasoline stocks in France, according to a well informed representative of a French oil company who was in New York the latter part of the week, are at a point where a delay of ten days in the arrival of a ship with consignment for almost any company would cause that company considerable embarrassment. Although the fact that stocks in France are abnormally low has been pretty generally known to United States suppliers for some time past, not until now has it been realized that French companies were operating so close. In some quarters it was felt French buyers would probably wait another week or ten days, before they begin to inquire actively, to see what effect the crude price revision might have on the light refined oil market.

A United Kingdom buyer was inquiring in the market late this week for approximately 50,000 barrels of 61-63, 390 end point gasoline for March loading. That this company is under contract with a Roumanian refiner for the bulk of its requirements, however, discredited the value of the inquiry to United States suppliers, who are in on the fact that any abnormally low price that might be obtained for shipment from the Gulf would most likely be used only as a means of obtaining a similar price over there, as has been the case several times in the past.

The buyer indicated 10 cents per Imperial gallon, c.i.f., as a price they would be willing to pay for 61-63, 390 end point gasoline at the Gulf. This figures approximately 7.40 cents per American gallon f.o.b. the Gulf whereas the minimum price quoted for this grade by any supplier at the Gulf is 7.875 cents and has been for several months past.

Sellers' opinions of gasoline prices were generally unchanged most of the week. It was indicated in several quarters toward the end of the week, however, that 61-63, 390 end point gasoline and 64-66, 375 end point gasoline might be more easily obtained at 7.875 cents and 8.125 cents, respectively. A number of suppliers continued to quote 8 cents and 8.25 cents, respectively, for these two grades. Virtually all suppliers, however, expressed their ideas of the U. S. Motor market as 7 cents flat. The last business closed for this grade was at 6.875 cents.

Other oils were in little demand

(*Continued on Page* 138)

Complete Seaboard Market

(Export markets for whole year given in OIL PRICE HANDBOOK. Each volume carries refinery, tank wagon, crude and export markets—complete for the years 1924-1925-1926-1927)

Eastern Domestic Market

(Prices for tank car lots, f.o.b. refinery or seaboard terminal, represent majority of quotations and sales.)

	Feb. 27	Feb. 20	Feb. 13
U.S. Motor gasoline, New York harbor	8.00	8.00	8.00
U.S. Motor gasoline, Philadelphia	8.00 – 8.25	8.00 – 8.25	8.00 – 8.25
U.S. Motor gasoline, Boston district	9.00 – 9.25	9.00 – 9.25	8.75 – 9.25
U.S. Motor gasoline, Providence district	8.75 – 9.25	8.75 – 9.25	8.25 – 8.75
U.S. Motor gasoline, Baltimore	8.00 – 8.25	8.00 – 8.25	8.00 – 8.25
U.S. Motor gasoline, Norfolk	8.25	8.25	8.25
U.S. Motor gasoline, †Wilmington, N. C.	8.25	8.25	8.25
U.S. Motor gasoline, Charleston	8.00	8.00	8.00
U.S. Motor gasoline, Savannah	7.75 – 8.50	7.75	7.75
U.S. Motor gasoline, Jacksonville	7.75	7.50 – 7.75	7.50 – 7.75
California U.S. Motor gasoline, †New York Harbor	8.25	8.25	8.25
California U.S. Motor gasoline, Baltimore	8.50	8.50	8.50
California U.S. Motor gasoline, Philadelphia	8.25	8.25	8.25
Water white kerosene, New York Harbor	7.00	7.00 – 7.50	7.00 – 7.50
Water white kerosene, Philadelphia	6.75 – 7.00	6.75 – 7.00	6.75 – 7.00
Water white kerosene, Baltimore	7.25 – 7.50	7.25 – 7.50	7.25 – 7.50
28-34 gas oil, New York harbor	4.50 – 4.75	4.50 – 5.00	4.50 – 5.00
28-34 gas oil, Boston district	4.50 – 4.75	4.50 – 4.75	4.50 – 5.00
38-42 furnace oil, New York harbor	5.75	5.75	5.75
36-40 furnace oil, Boston district	5.25 – 5.75	5.50 – 5.75	5.75
Grade C bunker oil, New York harbor	$1.35	$1.35	$1.35
Grade C bunker oil, Boston district	$1.35	$1.35	$1.35 –$1.40
Diesel oil, New York harbor	$2.00	$2.10	$2.10

Note: Above prices do not include inspection tax levied in some states.

MEDICINAL OILS

Russian 885-890 s.g., 325-330 vis	$0.80 – 0.90	$0.80 – 0.90	$0.80 – 0.90
Russian 870-875 s.g., 150-155 vis	$0.67 – 0.77	$0.67 – 0.77	$0.67 – 0.77
Russian 860-865 s.g., 80-85 vis	$0.65 – 0.75	$0.65 – 0.75	$0.65 – 0.75

†Only one refiner quoting.

New York Export Market

(Gasoline and kerosene in cases in bulk. Lubricating oils are per gal. in bbls. Cylinder oils are Penna. products.)

	Feb. 27	Feb. 20	Feb. 13
U. S. Motor gasoline	23.65	23.65	23.65
43-45, 150 w.w. kerosene	17.90	17.90	17.90
42-44, 110 s.w. kerosene	16.90	16.90	16.90
CYLINDER OILS			
Bright stock, dark	33.00 –34.50	33.00 –34.50	34.00 –35.00
600 D filtered	30.00 –31.00	30.00 –31.00	30.00 –31.00
600 Warren E filtered	23.50 –25.00	23.50 –25.00	23.50 –25.00
600 s.r. unfiltered	16.00 –17.00	16.00 –17.00	16.25 –17.25
650 s.r. unfiltered	18.75 –19.50	18.75 –19.50	18.75 –19.50
600 flash s.r.	20.50 –21.00	20.50 –21.00	22.00 –23.00
630 flash, s.r.	33.00 –34.00	33.00 –34.00	34.00 –35.00
RED ENGINE OILS (Vis. 100°)			
300 vis. No. 6½ color	20.00	20.00	20.00
250 vis. No. 6 color	19.00	19.00	19.00
200 vis. No. 6 color	18.50	18.50	18.50
PALE ENGINE OILS (Vis. 100°)			
230 vis. No. 3¾ color	24.00	24.00	24.00
180 vis. No. 3¼ color	20.00	20.00	20.00
100 vis. No. 2¼ color	15.75	15.75	15.75
MOTOR OILS (Vis. 100°)			
600 vis. No. 7 color	35.00	35.00	35.00
500 vis. No. 6¾ color	33.00	33.00	33.00
400 vis. No. 7¼ color	31.00	31.00	31.00
300 vis. No. 6 color	30.00	30.00	30.00
200 vis. No. 3¼ color	24.00	24.00	24.00
MEDICINAL OILS			
875-885 s.g.	$0.80	$0.80	$0.80
865-870 s.g.	$0.70	$0.70	$0.70

WAXES (In cents per pound, f.a.s. carload lots)

WHITE CRUDE SCALE (In barrels)

	Feb. 27	Feb. 20	Feb. 13
122-124 A.m.p.	3.125– 3.25	3.125– 3.25	3.15 – 3.25
124-126 A.m.p.	3.125– 3.25	3.125– 3.25	3.15 – 3.25
FULLY REFINED (In burlap bags)			
123-125 A.m.p. Phila.	4.00	4.00	4.00
125-127 A.m.p.	4.00	4.00	4.00
128-130 A.m.p.	4.125– 4.25	4.125– 4.25	4.125– 4.25
130-132 A.m.p.	4.25 – 4.375	4.25 – 4.375	4.25 – 4.375
133-135 A.m.p.	*5.25 – 5.50	*5.25 – 5.50	*5.25 – 5.50
135-137 A.m.p.	*5.50 – 6.00	*5.50 – 6.00	*5.50 – 6.00
YELLOW CRUDE SCALE			
124-126 A.m.p.	3.00	3.00	3.00 – 3.125

***Prices nominal.**

Gulf Export Market

(Feb. 27 prices, f.o.b. Gulf oil terminals in Texas and Louisiana, shipments of 20,000 bbls. and over unless otherwise noted, represent sellers' opinions, except those prices specified to the contrary.)

GASOLINE	Feb. 27	Feb. 20	Feb. 13
U. S. Motor	7.00	7.00	7.00
60-62, 400 e.p.	7.75	7.75	7.75
61-63, 390 e.p.	7.875– 8.00	7.875– 8.00	7.875– 8.00
64-66, 375 e.p.	8.125– 8.375	8.125– 8.375	8.125– 8.375
U. S. Motor, cases (cargoes)	$1.60	$1.60	$1.60
64-66, cases (cargoes)	$1.75	$1.75	$1.75

***Nominal.**

KEROSENE			
44 water white	6.50 – 6.75	6.50	6.50
41-43 prime white	5.50 – 5.75	5.50	5.50
Water white, cases (cargoes)	$1.55	$1.55	$1.55
Prime white, cases (cargoes)	$1.45	$1.45	$1.45
DOMESTIC GAS & BUNKER OILS			
26-28 translucent gas oil	4.00	4.00	4.00
30-32 translucent gas oil	4.00	4.00	4.00 – 4.25
Grade C bunker oil	$1.00 –$1.15	$1.00 –$1.15	$1.00 –$1.15
Grade C bunker oil, cargoes	$0.95	$0.90 –$0.95	$0.90 –$0.95
MEXICAN CRUDE AND BUNKER OILS (F.O.B. Steamer, Tampico)			
Heavy Panuco crude taxes to be paid	$1.05	$1.05	$1.05
Grade C bunker oil, for bunkering purposes, taxes paid	$1.20	$1.20	$1.20

SOUTH TEXAS LUBRICATING OILS (Viscosity at 100° F.; cold test 0). (Tanker, f.o.b. Houston)

100 vis. No. 2 unfiltered pale	5.50 – 6.00	5.50 – 6.00	5.50 – 6.00
200 vis. No. 3 unfiltered pale	7.50 – 8.00	7.50 – 8.00	7.50 – 8.00
300 vis. No. 3 unfiltered pale	8.875– 9.00	8.875– 9.00	8.875– 9.00
500 vis. No. 3 unfiltered pale	11.00 –11.25	11.00 –11.25	11.00
200 vis. No. 5½ red oil	6.875– 7.00	6.875– 7.00	6.875– 7.00
300 vis. No. 5½ red oil	8.00 – 8.125	8.00 – 8.125	8.00
500 vis. No. 6 red oil	9.00 – 9.50	9.00 – 9.50	9.00 – 9.50

Pacific Export Market

(Quotations are at seaboard, Los Angeles, in cargo lots, cents per gallon, except where otherwise noted.)

	Feb. 27	Feb. 20	Feb. 13
Gasoline, U. S. Motor, 53-55 Gravity	6.125– 6.25	6.25 – 6.75	6.25 – 6.75
Gasoline, U. S. Motor, blends and special cuts	7.00 – 8.00	7.00 – 8.00	7.00 – 8.00
Gas Oil, 30-34, per barrel	$1.05 –$1.10	$1.05 –$1.10	$1.05 –$1.10
Diesel Oil, 27 plus, per barrel	$0.95 –$1.05	$0.95 –$1.05	$0.95 –$1.05
Bunker oil, 14-18, per barrel	$0.80 –$1.00	$0.80 –$1.00	$0.80 –$1.00
Fuel oil, 14-18, per barrel	$0.67 –$1.00	$0.70 –$1.00	$0.72 –$1.00
Kerosene, 38-40 w.w., 125-150 flash, per gal.	4.50 – 5.00	4.50 – 5.00	4.50 – 4.75
Cased Goods			
Gasoline, U. S. Motor	$1.70 –$1.80	$1.70 –$1.80	$1.70 –$1.80
Kerosene, 38-40 w.w., 125-150 flash	$1.35 –$1.45	$1.35 –$1.45	$1.35 –$1.45

Crude Oil Prices, as Posted by Major

(Crude prices for years 1924-1925-1926-1927 in

EASTERN FIELDS

(Posted by Joseph Seep Purchasing Agency)

Penna. Grade Oil in New York Transit Lines (Alleghany, N. Y. District)	$2.80
Bradford District Oil in National Transit Lines (Bradford District)	2.80
Penna. Grade Oil in National Transit Lines (Other Pennsylvania)	2.65
Penna. Grade Oil in Southwest Penna. Pipe Lines (Other Pennsylvania)	2.65
Penna. Grade Oil in Eureka Pipe Lines (West Virginia)	2.60
Penna. Grade Oil in Buckeye Pipe Lines (Macksburg, O. district)	2.35
Keister Grade in National Transit Lines (Butler Co)	1.10
Cabell Grade in Eureka Pipe Lines (West Virginia)	1.35
Corning Grade in Buckeye Pipe Lines (Ohio)	1.55
Corning, O. heavy grade	1.45
*Somerset Oil in Cumberland Pipe Lines (Kentucky)	1.45
Ragland Grade in Cumberland Pipe Lines (Kentucky)	.95

*Somerset oil run prior to Oct. 1922, takes price of 6 cents lower than above quotations.

(Posted by Stoll Oil Refining Co.)

Oil City, Ky., oil in Stoll lines	$1.50

CENTRAL STATES FIELDS

Posted by Ohio Oil Co.

Wooster	$1.57	Plymouth	$1.23
Lima	1.55	West Kentucky	1.33
Waterloo	1.20	*Canadian Petro.	1.95
Indiana	1.32	*Oil Springs	2.02
Princeton	1.50	*Posted by Imperial Oil Ltd.	
Illinois	1.50		

OKLAHOMA, KANSAS and NORTH TEXAS

Prices of Prairie Oil & Gas Co.

(In Oklahoma, Kansas, North and East Central Texas)

Effective Feb. 21, 1928

28-28.9	$0.96	41-41.9	$1.43
29-29.9	1.01	42-42.9	1.46
30-30.9	1.06	43-43.9	1.49
31-31.9	1.11	44-44.9	1.52
32-32.9	1.16	45-45.9	1.55
33-33.9	1.19	46-46.9	1.58
34-34.9	1.22	47-47.9	1.61
35-35.9	1.25	48-48.9	1.64
36-36.9	1.28	49-49.9	1.67
37-37.9	1.31	50-50.9	1.70
38-38.9	1.34	51-51.9	1.73
39-39.9	1.37	52 and above	1.76
40-40.9	1.40		

Humble Oil & Refining Co. Prices

(Ranger, North Texas, Mexia, Powell, Richland, Wortham, Lytton Springs, Currie, Moran and Nocona crudes all in Texas.)

Effective Feb. 21, 1928

Below 25	$0.76	26-26.9	$0.86
25-25.9	0.81	27-27.9	0.91

Humble Prices (Cont'd)

28-28.9	$0.96	37-37.9	$1.31
29-29.9	1.01	38-38.9	1.34
30-30.9	1.06	39-39.9	1.37
31-31.9	1.11	40-40.9	1.40
32-32.9	1.16	41-41.9	1.43
33-33.9	1.19	42-42.9	1.46
34-34.9	1.22	43-43.9	1.49
35-35.9	1.25	44 and above	1.52
36-36.9	1.28		

Mirando, Tex	$1.00

Magnolia Petroleum Co.

(In Oklahoma, Kansas and North and East Central Texas)

Feb. 21, Magnolia posted in above fields and in Panola Co., same schedule as Prairie, except these grades, unchanged from Feb. 16:

Below 30	$0.75
30-30.9	0.90
31-31.9	1.05
Glasscock and Howard Counties	$0.60
Chalkfield (Howard Co.)	$0.80
Iatan district	$0.93
Corsicana heavy	$1.00

Carter Oil Co.

(Oklahoma and Kansas)

Feb. 21, same schedule as Prairie plus these grades:

24-24.9	$0.76	26-26.9	$0.86
25-25.9	0.81	27-27.9	0.91

PANHANDLE, TEXAS

Humble Oil & Refining Co.

Effective Feb. 21, 1928

Hutchinson and Carson Counties:

Below 31	$0.60	38-38.9	$0.88
31-31.9	0.65	39-39.9	0.91
32-32.9	0.70	40-40.9	0.94
33-33.9	0.73	41-41.9	0.97
34-34.9	0.76	42-42.9	1.00
35-35.9	0.79	43-43.9	1.03
36-36.9	0.82	44 and above	1.06
37-37.9	0.85		

Wheeler County:

Below 29	$0.60	37-37.9	$0.95
29-29.9	0.65	38-38.9	0.98
30-30.9	0.70	39-39.9	1.01
31-31.9	0.75	40-40.9	1.04
32-32.9	0.80	41-41.9	1.07
33-33.9	0.83	42-42.9	1.10
34-34.9	0.86	43-43.9	1.13
35-35.9	0.89	44 and above	1.16
36-36.9	0.92		

Gray County:

Below 27	$0.60	36-36.9	$1.02
27-27.9	0.65	37-37.9	1.05
28-28.9	0.70	38-38.9	1.08
29-29.9	0.75	39-39.9	1.11
30-30.9	0.80	40-40.9	1.14
31-31.9	0.85	41-41.9	1.17
32-32.9	0.90	42-42.9	1.20
33-33.9	0.93	43-43.9	1.23
34-34.9	0.96	44 and above	1.26
35-35.9	0.99		

WEST TEXAS

Humble Oil & Refining Co.

Effective Aug. 23

Crane, Upton, Crockett and Pecos Counties	$0.60

NORTH LOUISIANA—ARKANSAS FIELDS

Prices of Standard Oil Co. of Louisiana Caddo, Homer, Haynesville, Bull Bayou, El Dorado, Crichton and De Soto.

Effective Feb. 21, 1928

Below 28	$0.91	40-40.9	$1.40
28-28.9	0.96	41-41.9	1.43
29-29.9	1.01	42-42.9	1.46
30-30.9	1.06	43-43.9	1.49
31-31.9	1.11	44-44.9	1.52
32-32.9	1.16	45-45.9	1.55
33-33.9	1.19	46-46.9	1.58
34-34.9	1.22	47-47.9	1.61
35-35.9	1.25	48-48.9	1.64
36-36.9	1.28	49-49.9	1.67
37-37.9	1.31	50-50.9	1.70
38-38.9	1.34	51-51.9	1.73
39-39.9	1.37	52 and above	1.76

*Smackover, below 24	$0.75		
* do 24 and above	.90		
Bellevue	1.25		
Cotton Valley	.75		
**Urania, La	.75		
†East El Dorado	1.00		

**Posted by Louisiana Oil Refining Corp.

†Posted by Magnolia Petroleum Co.

*Smackover prices posted on Feb. 7 by S. O. La., Gulf, Shreveport-El Dorado Pipe Line, Atlantic Oil Producing Co. and The Texas Co.; on Feb. 8 by Magnolia; on Feb. 6, by La. Oil Refg. Corp.

STEPHENS, ARKANSAS

Louisiana Oil Refining Corp.

Below 28	$0.85	30-30.9	$0.91
28-28.9	0.87	31-31.9	0.93
29-29.9	0.89	32 and above	0.95

GULF COASTAL

Posted by Humble Oil & Refining Co.

Effective March 14, 1927

Grades A	$1.20	29-29.9	$1.25
Grades B:		30-30.9	1.27
Below 25	1.15	31-31.9	1.29
25-25.9	1.17	32-32.9	1.31
26-26.9	1.19	33-33.9	1.33
27-27.9	1.21	34-34.9	1.35
28-28.9	1.23	35 and above	1.37

Fields classified as A and B are Spindletop, Goose Creek, Hull, Liberty, Sour Lake, West Columbia, Orange, Boling and Pierce Junction. All other fields are Grades A only.

(*Continued from Page* 136)

at the Gulf and quotations for the most part stood at last week's levels. Water white kerosene was offered at 6.50 to 6.75 cents and prime white, 5.50 to 5.75 cents. It was indicated a cargo of 30-32 gas oil would likely be closed early next week; quotations for this commodity remained at 4 cents.

No cargo sales of Grade C bunker oil were reported at the Gulf this week. Low gravity oil which sold at $0.90 a barrel last week was reported no longer available at this price. A cargo of Grade C for export shipment from north Atlantic port was reported sold at a price which figures approximately $0.92 a barrel at the Gulf.

Fairbanks, Morse & Co., 900 S. Wabash Ave., Chicago, has announced the election of P. C. Brooks as vice president.

Wax Market is Unchanged In Demand and Price

NEW YORK, Feb. 25.—Wax markets were dull this week and few changes of consequence were noted in prices either at New Orleans or New York.

It was said in some quarters that white crude scale had sold a shade lower at New York late in the week but for the most part sellers were fairly firm in their quotations of 3.125 to 3.25 cents. Inquiries from the United Kingdom continued relatively few.

One of the largest suppliers of scale at New York asserted his company was delivering approximately 600 tons in February, and that although their production remained comparatively high, their offerings would not be a disturbing factor in the early March market.

Brokers continued to report white scale rather hard to find in the Mid-Continent. Prices at New Orleans, as a result, remained generally unchanged. A large supplier in the Mid-Continent reported his March output sold up at around 3.50 cents a pound, New Orleans. Apparently other refiners in this area also are committed to a great extent over March inasmuch as offerings over this period so far have been extremely limited. There was little demand from South American buyers for spot stuff reported this week.

All markets for fully refined wax were without material change, prices remaining relatively firm.

Cities Service Co.—Net to common stock and reserves in 17 months ended Jan. 31 was $22,392,015, compared with $16,741,493 in preceding 12 months, a gain of $5,650,522 or 33 per cent.

Purchasers, in All Fields (in Effect February 27)

OIL PRICE HANDBOOK published annually)

GULF COASTAL

Prices of The Texas Co.

Effective March 14, 1927

Grades A	$1.20	*Grades B	$1.15
‡Grades B (light crude):			
35-35.9	$1.37	38-38.9	$1.43
36-36.9	1.39	39-39.9	1.45
37-37.9	1.41	40 and above	1.47

*Grades B include all heavy crudes which do not meet tests for Grades A or for Gulf Coast light crude.

‡The Texas Co.'s gravity and price schedule on oil below 35° is same as Humble's postings on Grades B.

ROCKY MOUNTAIN FIELDS

Prices of Ohio Oil Co., and Midwest Refining Co.

(Salt Creek prices effective Feb. 21, 1928)

‡Salt Creek below 29	$0.96
" " 29-29.9	1.01
" " 30-30.9	1.06
" " 31-31.9	1.11
" " 32-32.9	1.16
" " 33-33.9	1.19
" " 34-34.9	1.22
" " 35-35.9	1.25
" " 36-36.9	1.28
" " 37 and above	1.31
Elk Basin	1.33
Grass Creek light	1.33
Big Muddy	$1.25
Lance Creek	1.33
Rock Creek	1.25
Mule Creek	1.30
Rex Lake	1.10
‡Osage	1.33
‡Cat Creek, Mont.	1.33
Sunburst, Mont.	1.50
‡Hogback, N. Mex.	1.38
Artesia, N. Mex.	1.00

‡Posted by Midwest Refining Co. Midwest also buys Grass Creek light and Elk Basin.

The Texas Co. buys Salt Creek and Big Muddy crude.

CALIFORNIA

Standard Oil Co. of California

Santa Maria and Ventura Posted by Union Oil Co.

Gravity	Signal Hill Seal Beach Huntington Beach	Inglewood Torrance	Whittier La Habra	Newhall, McKittrick, Kern River	Olinda-Brea Canon, Richfield	Athens-Rosecrans Dominguez	Montebello	Coyote Hills	Santa Fe Springs	Midway Sunset Buena Vista & Elk Hills	Lost Hills	Coalinga	Wheeler Ridge	Santa Maria	Ventura
14-14.9	$ .85	$ .85	$ .85	$ .75	$ .85	....	$ .85	$ .85	....	$ .75	$ .75	$ .75	$ .75	$ .85	$ .85
15-15.9	.85	.85	.85	.75	.85	....	.85	.85	....	.75	.75	.75	.75	.85	.85
16-16.9	.85	.85	.85	.75	.85	....	.85	.85	....	.75	.75	.75	.75	.85	.85
17-17.9	.85	.85	.85	.75	.85	....	.85	.85	....	.75	.75	.75	.75	.85	.85
18-18.9	.85	.85	.85	.75	.85	....	.85	.85	....	.75	.75	.75	.75	.85	.85
19-19.9	.85	.85	.85	.75	.85	....	.85	.85	....	.75	.75	.75	.75	.85	.85
20-20.9	.85	.85	.85	....	.85	....	.85	.85	....	.77	.77	.76	.76	.85	.85
21-21.9	.86	.86	.85	....	.86	....	.85	.86	.85	.79	.79	.77	.77	.85	.85
22-22.9	.87	.87	.85	....	.87	....	.85	.87	.85	.81	.81	.78	.78	.85	.85
23-23.9	.88	.88	....	....	.88	....	.85	.88	.85	.83	.83	.79	.79	.85	.85
24-24.9	.89	.89	....	....	.89	$ .89	.85	.89	.85	.85	.85	.80	.80	.85	.85
25-25.9	.90	.90	....	....	.90	.90	.86	.90	.86	.87	.87	.81	.81	.86	.86
26-26.9	.92	.92	....	....	.92	.92	.87	.91	.87	.89	.89	.83	.82	.87	.87
27-27.9	.94	.94	....	....	.94	.94	.88	.92	.88	.91	.91	.85	.83	.88	.88
28-28.9	.96	.96	....	....	.96	.96	.89	.93	.89	.93	.93	.87	....	.89	.89
29-29.9	.98	....	....	....	.98	.98	.90	.94	.91	.96	.96	.89	....	.91	.91
30-30.9	1.00	....	....	....	1.00	1.00	.91	.95	.93	.99	.99	.91	....	.93	.93
31-31.9	1.03	....	....	....	....	1.03	....	....	.95	1.02	1.02	.93	....	....	.95
32-32.9	1.06	....	....	....	....	1.06	....	....	.97	1.05	1.05	.95	....	....	.97
33-33.9	....	....	....	....	....	1.09	....	....	.99	1.08	1.08	.97	....	....	.99
34-34.9	....	....	....	....	....	1.12	....	....	1.01	....	1.11	.99	....	....	1.01
35-35.9	....	....	....	....	....	1.15	....	....	1.03	....	....	1.01	....	....	1.03
36-36.9	....	....	....	....	....	1.18	....	....	1.06	....	....	....	....	....	1.06
37-37.9	....	....	....	....	....	1.21	....	....	1.09	....	....	....	....	....	1.09
38-38.9	....	....	....	....	....	1.24	....	....	1.12	....	....	....	....	....	1.12
39-39.9	....	....	....	....	....	1.27	....	....	1.15	....	....	....	....	....	1.15
40-40.9	....	....	....	....	....	1.30	....	....	....	....	....	....	....	....	....
41-41.9	....	....	....	....	....	1.33	....	....	....	....	....	....	....	....	....
42-42.9	....	....	....	....	....	1.36	....	....	....	....	....	....	....	....	....

*Union Oil Co. also purchases Long Beach Crude and is maintaining the same gravity and price schedule in that field as the Standard maintains in Signal Hill and Huntington Beach fields. The Union also buys and pays the same prices as the Standard in the Rosecrans-Dominguez fields, on gravities ranging from 14 degrees to and including 24.9 degrees and in Santa Fe Springs, on gravities ranging from 20 to and including 23.9 degrees.

REFINERS' and COMPOUNDERS' SUPPLIES

Following are average market prices for materials used by refiners and compounders as effective the date shown.

Refiners' Supplies

	Feb. 27	Feb. 20
Soda Ash light 58% bags, cwt.	$1.325	$1.325
Silicate of Soda 60 deg. drums, cwt.	$1.65	$1.65
Silicate of Soda 40 deg. tank cars, cwt.	$0.60	$0.60
Silicate of Soda 40 deg. drums, cwt.	$0.80-0.95	$0.80-0.95
Sal Soda wks.	$0.90-1.10	$0.90-1.10
Caustic Soda 75% solid, cwt.	$3.66	$3.66
Chloride of Lime, cwt., wks.	$2.00	$2.00
Sulfuric Acid 60 deg. tank cars, f.o.b. shipping point per ton	$11.00	$11.00
Oleum 20%, fuming sulfuric, tank cars, wks	$18.50	$18.50
Sulfur, flowers of, cwt.	$3.10-4.00	$3.10-4.00
Liquid Chlorine, tank cars, wks., lb.	3.50-3.75	3.50-3.75
Litharge, powdered, casks, cwt.	$8.75	9.00

Compounders' Supplies

	Feb. 27	Feb. 20
Vegetable Oils		
Linseed carloads, spot, lb.	9.80	9.80
Tanks, spot	9.00	9.00
Soya Bean, Tanks, coast, lb.	9.75	9.75
Oleic Acid		
Distilled, tanks, lb.	9.00	9.00
Distilled, bbls., lb.	9.75	9.75
Saponified, tanks, lb.	9.25	9.25
Saponified, bbls., lb.	10.00	10.00
Lard Oils		
Prime Winter Strained, lb.	15.50	15.50
Extra Winter Strained, lb.	12.875	12.875
Extra, lb.	12.375	12.375
Extra No. 1, lb.	11.75	11.75
No. 1, lb.	11.25	11.25
No. 2, lb.	10.75	10.75
Tallow oil, lb.	11.375	11.375
Neatsfoot Oil		
Pure, bbls., lb.	15.50	15.50
Extra, bbls., lb.	12.00	12.00
No. 1, bbls., lb.	11.50	11.50
Cold Pressed, lb.	18.50	18.50
Fish Oils		
Menhaden Oil		
Light Pressed, gal.	60-62	60-62
Light Pressed, tank cars, N. Y., gal.	52	52
White, gal.	66	66
Yellow bleached, gal.	63	63
Whale, extra winter bleached, gal.	82	82
Naval Stores		
Steam distilled turpentine, N. Y., gal.	55	55
Steam distilled turpentine, Savannah, gal.	50	50
Gum turpentine, N. Y., gal.	60	60
Gum turpentine, f.o.b. cars Savannah, gal.	56	56
Wood Rosin F, N. Y., bbl.	$7.80	$7.80
Wood Rosin F, Savn'h, bbl.	$7.00	$7.00
Gum Rosin B, N. Y., bbl.	$8.45	$8.40
Gum Rosin B, f.o.b. cars Savannah, bbl.	$7.70	$7.65
Rosin oil, pure, gal.	55	55
Rosin oil, compounded, gal.	47	47
Pine Tar		
Kiln burnt, bbl.	*$13.00	*$13.00
Retort, bbl.	$16.00	$16.00
Alcohol		
Denatured, Formula 5, in bbls., per gal.	55-56	55-56

*Nominal.

OIL STOCKS AND FINANCES

National Petroleum News

Richfield Tells Large Gain in Profits

LOS ANGELES, Feb. 25.—Net profits of Richfield Oil Co. of California in 1927 were $3,742,900, after depreciation, depletion, and federal income tax. Net in previous years of Richfield and its predecessors were: 1926 $2,644,400; 1925 $1,651,900; 1924 $1,136,595; and 1923 $718,610.

Total net sales during 1927 were $38,612,000, an increase of $6,541,000 over 1926. Company's gasoline sales in 1927 were 158,449,000 gallons, or an increase of 23 per cent over 1926 sales.

Arkansas-Louisiana Gas Companies to Merge

CLEVELAND, Feb. 25.—The Empire Gas & Fuel Co. properties that are involved in the proposed merger of the Arkansas Natural Gas Co. and other southwestern natural gas companies, are approximately 20,000 acres of gas leaseholds in Franklin and Johnson counties, Arkansas. Recent reports did not specify the extent of the Empire properties involved.

The merger proposal will be voted on March 6 at a special meeting of the Arkansas Natural Gas Co. stockholders. This company, the Natural Gas & Fuel Corp., and the Industrial Gas Co. of Marshall, Texas, will be consolidated. The Empire gas acreage mentioned before, the natural gas properties of the Southwestern Gas & Electric Co., and the gas and oil production and transmission property of the Bethany Oil & Gas Co. will be bought, President J. R. Munce of the Arkansas company, has written stockholders. The consolidated corporation will be styled the Arkansas Natural Gas Corp., and will be chartered in Delaware.

The enlarged company will distribute natural gas at retail in Shreveport, Bethany, Mooringsport and 12 other communities in Louisiana; at Texarkana, Longview, Atlanta and two other communities in Texas, and Texarkana, Pine Bluff, El Dorado, and 27 other Arkansas communities. Little Rock, Hot Springs, and Camden, Ark., will be supplied with gas at wholesale. The company will have about 635 miles of main pipe lines and expects to distribute about 35,000,000,000 cubic feet of natural gas annually.

Capital will consist of $21,930,000 6 per cent cumulative preferred stock, shares of $10 par value each, and 4,084,225 no par common shares. It is proposed that the new corporation will issue $13,000,000 first mortgage 15-year 6 per cent bonds, proceeds from which will be used in buying the Southwestern and Bethany properties. Stockholders of the old Arkansas Natural Gas Co. are to receive 0.965 share of preferred and one share of common stock in the new company for each share held in the old.

Standard of Nebraska Profits Slump

CLEVELAND, Feb. 25.—Standard Oil Co. of Nebraska's indicated net profits in 1927 amounted to approximately $552,000 or 11.9 per cent on the $4,601,000 capital stock outstanding at the end of the year. The company does not issue an income statement and this computation is made from the Dec. 31 balance sheet and dividends paid during the year. In 1926 the company netted $917,756 or 20.12 per cent on the $4,559,850 capital stock outstanding that year. The company is engaged solely in marketing in Nebraska.

The balance sheets of Dec. 31, 1926 and 1927, compare:

ASSETS

	1927	1926
*Plant	$3,605,043	$2,932,249
Merchandise	1,179,092	1,050,840
Cash	553,729	963,574
Acct's receiv.	366,969	328,155
Investments	1,427,855	1,989,088
Total	$7,132,688	$7,263,906

*After depreciation.

LIABILITIES

Capital stock	$4,601,100	$4,559,850
Income tax, annuities	110,865	167,129
Acct's payable	376,105	496,911
Surplus	2,044,618	2,040,016
Total	$7,132,688	$7,263,906

Oil Company Earnings

Earnings (some reparts are preliminary) of several oil companies in 1927, which will be reported more fully in later issues of NATIONAL PETROLEUM NEWS, were:

	1927	1926
Crystal Oil Refg.	*$59,995	$279,329
Independent Oil	2,313,431	2,975,044
Louisiana Oil	188,622	2,039,376
Sun Oil	*2,791,057	3,358,899
Superior Oil	†545,057	75,851
Texas Pacific	315,190	1,578,043
White Eagle	*872,724	1,851,719
Wilcox Oil & Gas	*300,575	1,053,485

*Before federal income taxes. †Deficit.

Atlantic Refining Co.—Small profit will be shown by 1927 report, Chairman J. W. Van Dyke announced. Annual report is not due for some time yet.

Continental Oil Omits Dividend Payment

DENVER, Feb. 25.—Continental Oil Co. has omitted its dividend of 25 cents a share which ordinarily would have been paid March 15, because, according to S. H. Keoughan, president, of demoralized markets. This is the first time since the dissolution of the old Standard Oil Co., of which Continental was a subsidiary, that a dividend has been passed. The company has paid at the rate of $1 a share a year or 10 per cent. The lowest previous rate paid was in 1913 when disbursements were 6 per cent after the declaration of a 900 per cent stock dividend. In 1914 the rate was doubled.

Concerning the 1927 operation, Mr. Keoughan said:

"While final figures have not yet been completed, it is estimated that company earned during 1927, over all expenses, including a deduction of approximately $3,000,000 for intangible drilling costs and a heavy write-off for inventory adjustments, approximately $5,400,000, before deductions for depletion and depreciation. Dividends paid in 1927 amounted to $3,758,000, and it was judgment of directors that difference of approximately $1,600,000 was an inadequate amount to carry to reserves for depletion and depreciation."

In 1927 Continental had gross production of 10,400,000 barrels and net production, after deducting royalties and other interests, of more than 7,000,000 barrels of crude oil, although a substantial amount was shut in. Company ended 1927 with net current assets of about $17,000,000 including $5,000,000 of call loans or equivalent.

"However, in view of uncertain outlook for the industry for 1928, and continued necessity of storing a considerable part of company's crude production, directors are of the opinion that the best interests of stockholders will be served by deferring a declaration of the regular dividend until conditions in the industry improve," Mr. Keoughan concluded.

Independent Oil & Gas Co.—Earnings in 1927 after depreciation, depletion, federal income taxes and other charges were $2,315,325, equivalent to $4.63 per no par share, compared with $5.95 a share in 1926. The 1927 figures are preliminary. Fourth quarter income in 1927 was $469,496, compared with $884,801 in the last quarter of 1926.

Transactions in Oil Shares on New York Stock Exchange

1927 High	1927 Low	1928 High	1928 Low	Listed Capital	Par Value	Stocks	Div. Rate	Last Paid	Transactions Week Ended Feb. 25 Sales	First	High	Low	Last	Change
37⅞	27⅜	32⅜	27⅛	(sh) 922.075	N.P.	Amerada Corp.	50cQ	Jan. 31, 28	11.700	27⅞	29⅜	†27⅛	29⅜	+ 2¼
82½	35⅛	76½	51¼	(sh) 209,180	N.P.	American Republics Corp.	.....	.....	12,700	55¾	61¾	56¼	61	+ 5¾
50¼	35	41¾	37½	$56.000,000	$ 25	Associated Oil	50cQ	Dec. 24, 27	170	38½	39	38	39	+ 1
131⅜	104	109⅞	95¾	50.000,000	100	Atlantic Refining	$1Q	Dec. 15, 27	8,400	97⅞	101¾	97⅛	100	+ 2
119	115½	118¼	116	20,000,000	100	do pfd	$1.75Q	Feb. 1, 28	200	116¼	116¼	116¼	116¼	0
35½	20¾	26½	22⅛	28,558.150	25	Barndsdall Corp. A	s62½cQ	Feb. 6, 28	13,300	22⅜	23¼	22⅜	23	+ ⅞
32½	20½	25¾	22	952,575	25	do B	s62½cQ	Feb. 6, 28	.....	.....	.....	.....	.....	.....
32⅞	20	26¼	24	$1,524.150	25	California Petroleum	25cQ	Mar. 1, 28	15,600	24¼	25⅜	24¼	25¼	+ ⅞
96¾	65	93¼	71¼	20,665.000	100	General Asphalt	.....	.....	16,700	72⅛	76½	†71¼	75	+ 3
144⅞	107¼	140¼	114	6,872.200	100	do pfd	$1.25Q	Mar. 1, 28	800	114½	115⅞	†114	115⅞	+ ⅜
175¾	60⅛	156⅛	127¾	25,000,000	100	Houston Oil	.....	.....	24.700	130	134	†127¾	130½	+ 1¾
32¾	17⅝	28¼	21¾	(sh) 500,000	N.P.	Independent Oil & Gas	25cQ	Jan. 30, 28	8,400	21¾	24⅜	†21¾	24	+ 2
12⅛	7⅝	12⅝	9	$3,280.240	$10	Indian Refining	.....	Dec. 15, 20	2,400	9⅜	10⅝	9¼	10¼	+ 1¼
12	7¼	10⅜	8⅛	4,550.110	10	do ctfs	.....	.....	600	8⅜	10	8⅝	10	+ 1½
112	99	109	101	2,296.400	10	do pfd	.....	Dec. 15, 21	200	104	105⅛	104	105½	+ ⅜
37¾	20½	35⅞	27⅜	(sh) 3,992.122	N.P.	Lago Oil & Transport	75cQ	Feb. 1, 28	3,300	28	30	†27⅜	29½	+ 1½
18⅛	10	12¾	9⅜	(sh) 1,136.500	N.P.	Louisiana Oil Refining	.....	.....	13,100	9⅞	10¼	†9⅜	10¼	+ ⅜
97	85¼	91	80	$4,000.000	$100	do pfd	$1⅝Q	Feb. 15, 28	60	80	88	†80	88	+ 3⅞
22¾	12	18⅛	12½	(sh) 330,000	N.P.	Maracaibo Oil	.....	.....	1,400	12⅜	13⅞	†12½	13⅞	+ 1⅜
58½	31	37½	33	(sh) 2,316,647	N.P.	Marland Oil Co.	.....	Mar. 31, 27	17,900	33¼	35¼	33¾	35	+ 1¾
320	200	360	280	$45,942.800	$100	Mexican Petroleum	$3Q	Jan. 20, 28	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	12,000,000	100	do pfd	$2Q	Jan. 20, 28	.....	.....	.....	.....	.....	.....
9¼	3	6⅞	4⅝	(sh) 945,939	N.P.	Mexican Seaboard	.....	Nov. 15, 24	2,900	5¾	6½	5½	6¼	+ ⅜
39⅜	25⅛	29½	25⅛	(sh) 1,357.461	N.P.	Mid-Continent Petroleum	.....	Aug. 1, 27	8,300	25⅛	26½	†25⅛	26	+ ⅜
105	97	105½	103¼	$6,718.000	$100	do pfd	$1.75Q	Mar. 1, 28	100	103¼	103¼	†103¼	103¼	— ½
3¾	1⅝	3⅜	2⅜	24,354.600	10	Middle States	.....	July 1, 23	4,100	2½	2¾	2½	2⅜	0
2¾	1⅜	2¾	1½	5,445.620	10	do ctfs	.....	.....	400	1¾	1⅞	1¾	1¾	0
1⅞	1	1⅝	1¼	(sh) 3,500.000	N.P.	Pacific Oil	.....	.....	2,200	1⅜	1⅜	1⅜	1⅜	0
65⅞	40⅛	46¾	38¼	$48,807,400	$ 50	Pan American P. & T.	.....	Oct. 20, 27	9,400	38⅜	40¼	†38¼	40	+ 1½
66⅜	40¼	46¾	37¾	121,097,100	50	do B	.....	Oct. 20, 27	25,100	38⅛	40½	†37¾	39¾	+ 1⅜
37⅞	16¾	21	18¼	(sh) 400,000	N.P.	Pan American Western B.	.....	Jan. 30, 27	300	19	19	18¾	18¾	+ ⅛
18⅞	8	16½	11½	(sh) 198,770	N.P.	Panhandle P. & R.	.....	.....	1,500	11¾	13¼	11½	12⅝	+ ⅝
83	54	81	70	$2,935,200	$100	do pfd	.....	July 2, 23	100	70	70	†70	70	— 7½
60¼	36¼	43½	35¼	(sh) 2,406.796	N.P.	Phillips Petroleum	75cQ	Jan. 3, 28	87,800	37½	38	†35¼	37⅞	+ ⅞
1⅛	⅜	¾	⅜	$29,622.925	$ 25	Pierce Oil Corp.	.....	.....	1,400	⅝	⅝	⅝	⅝	0
24	13½	20½	16¼	15.000,000	100	do pfd	.....	Feb. 1, 22	1,100	16¼	16¼	†16¼	16¼	— 1
5½	2½	4⅝	3½	(sh) 2,500.000	N.P.	Pierce Petroleum	.....	.....	2,800	3½	3¾	3⅝	3⅝	+ ⅛
33⅞	16¾	26	16	$37,450.850	$50	Producers & Refiners	.....	Sept. 15, 23	7,200	16¾	19⅝	16¾	19¼	+ 2¼
50	36⅛	45	41	2,845,350	50	do pfd	.....	May 1, 25	36,000	41¼	43	†41	43	+ 1⅜
33⅛	25	27½	19	75,959.250	25	Pure Oil Co.	12½cQ	Mar. 1, 28	15,800	20¼	21	20	20½	+ ⅜
115½	111⅜	112	112	13.000.000	100	do 8% pfd	$2Q	Jan. 2, 28	200	112	112	112	112	0
28⅝	25⅜	27⅞	24	$29,224,894	$25	Richfield Oil	25cQ	Feb. 1, 28	2,000	24⅛	25¼	†24	25⅛	+ 1⅜
54½	44¼	48¾	44⅝	(sh) 611.303	13.40	Royal Dutch, N. Y. shares	$1.343	Jan. 28, 28	6,700	46¼	46⅞	46¼	46¼	+ ½
47⅞	41⅜	43¼	40⅝	(sh) 77,590	£2	Shell Transport & T.	97c	Jan. 23, 28	600	42⅜	*43¼	42⅜	43¼	+ 2⅝
31¾	24⅝	26⅛	23¼	(sh)10,000.000	N.P.	Shell Union Oil	35cQ	Dec. 31, 27	6,500	24⅛	25¾	24	25⅜	+ 1¼
26⅜	14¼	24¾	18⅛	$7,208.080	$ 10	Simms Petroleum	.....	Apr. 1, 27	10,200	18⅝	20½	†18¼	19⅝	+ 1⅜
22⅜	15	21¼	17⅜	(sh) 4,501,915	N.P.	Sinclair Consolidated	.....	May 31, 24	49,300	17⅜	20⅜	†17⅜	19⅞	+ 2⅜
104½	97	108	102½	$16,604.600	$100	do pfd	$2Q	Feb. 15, 28	300	104	104	103¼	103¼	— ¾
37⅜	24⅛	28¼	25	27.396,590	25	Skelly Oil Co.	50cQ	Dec. 15, 27	5,200	25¼	26¼	25	26¼	+ 1
60¾	50⅜	56⅝	53	(sh)13.016.434	N.P.	S. O. California	62½cQ	Dec. 15, 27	9,900	53⅛	54	†53	53⅞	+ ½
41⅜	35⅜	40¼	37¾	$607,605,400	$ 25	S. O. New Jersey	‡25cQ	Dec. 15, 27	24,000	37¾	39¼	37¾	38⅜	+ ⅝
34⅛	29¾	31⅜	28¾	426,973.275	25	S. O. New York	40cQ	Dec. 15, 27	18,800	28⅞	29⅝	28¾	29⅜	+ ⅝
34⅞	30	38	31⅛	(sh) 1,206.073	N.P.	Sun Oil	‡25cQ	Dec. 15, 27	1,900	35⅜	37⅞	35⅛	37¾	+ 2⅜
101⅝	99	102	100	$5.000.000	$100	do pfd	$1.50Q	Mar. 1, 28	100	100¾	100¾	100¾	100¾	+ ½
6½	3⅛	3⅞	2½	(sh) 1,121.368	N.P.	Superior Oil Corp.	.....	Dec. 20, 20	3,100	2½	2¾	2½	2¾	+ ⅛
58	45	55⅜	50	$180.464 200	$ 25	The Texas Corp.	75cQ	Jan. 1, 28	17,900	50⅜	52¼	50¼	52	+ 1¼
18⅞	12	17	12½	8,380.340	10	Texas Pacific Coal & Oil	15cQ	Jan. 3, 28	8,400	12⅝	13⅞	12⅝	13⅜	+ ⅜
29⅛	19	22¼	19⅞	(sh) 2,168.404	N.P.	Tide Water Oil Co.	20cQ	Dec. 31, 27	100	19⅞	19⅞	†19⅞	19⅞	— ½
90⅛	85	90¾	87	$20.705,200	$100	do 5½% pfd	$1.25Q	Feb. 15, 28	500	89	90	89	90	+ ⅛
19⅛	15¾	17¼	14¾	(sh) 4,796.101	N.P.	Tide Water Associated	.....	Aug. 1, 27	8,100	15¼	15¼	†14¾	15	+ ⅛
90¾	85	87¾	82½	$72.745,900	$100	do pfd	$1.50Q	Jan. 3, 28	900	83	83½	†82½	83	— ⅝
10¾	3¾	10⅛	7¼	(sh) 3,742.029	N.P.	Transcontinental Oil	.....	.....	27.900	7¾	8	7⅜	7⅞	+ ⅛
56½	39⅝	45¼	42¾	$407.777,750	$ 25	Union Oil of California	50cQ	Feb. 10, 28	12,400	43	45¾	43	44½	+ ½
†271½	94	125	119⅛	30.844.000	100	Union Tank Car Co.	$1.25Q	Dec. 1, 27	100	119⅛	119⅛	†119⅛	119⅛	+ ⅞
34½	24½	32⅞	26	(sh) 240.380	N.P.	Warner Quinlan	50cQ	Jan. 3, 28	4,000	28¼	30	28	29½	+ 1⅜
27½	20	24¼	20⅛	(sh) 490,000	N.P.	White Eagle Oil & Refining	25cQ	Jan. 20, 28	1,100	20¼	20½	20⅛	20¼	— ⅛

*New High †New Low ‡Also extras s-Stock Total Sales 578,330

Cleveland Stock Market

February 24	Par Value	Bid	Asked	Last Sale
Canfield Oil Co.	100	...	...	...
do pfd.	100	100	...	100
Fred G. Clark	10	2⅝	3½	2⅝
National Refining Co.	25	35½	40	36
do pfd.	100	133	135	135
Paragon Refining Co.	25	9¾	10¾	10¼
do pfd.	100	...	108	106½

x Ex-Dividend

Oil Dividends

	Amount	Payable	Stock of Record
Phillips Pet. q.	37½c	Apr. 2	Mar. 15
Texas Corp. q.	75c	Apr. 1	Mar. 2
Tidal Osage Oil q.	50c	Mar. 15	Mar. 5

Sinclair Consolidated Oil Corp.—James J. McGraw, president, Exchange National Bank, Tulsa, has been elected a director. Mr. McGraw has long been identified with the producing division of the industry.

Pittsburgh Stock Exchange

1927 High	1927 Low	1928 High	1928 Low	Par Value	Stocks	Transactions Week Ended February 24 Sales	First	High	Low	Last	Change
9⅞	6¾	9½	7¾	$ 10	Arkansas Nat. Gas.	1,965	8	8¼	†x7¾	7¾	— ¼
98⅝	80⅜	94	92	100	Columbia Gas.	.....	.....	.....	.....	.....	.....
107⅞	100	108	108	100	do pfd.	.....	.....	.....	.....	.....	.....
15	7½	10	7½	10	Devonian Oil	140	8½	8½	8½	8½	0
117½	115	116	115	100	Duquesne Light pfd.	.....	.....	.....	.....	.....	.....
....	....	85	80½	100	Fayette County Gas.	.....	.....	.....	.....	.....	.....
12¾	6	13	12	N.P.	Houston Gulf Gas.	275	12¼	12¼	12¼	12¼	+ ½
59¼	37¼	55¾	52½	$ 25	Lone Star Gas.	575	53	54½	52⅜	54	+ 1
3¾	3	4	3¼	5	Pittsburgh Oil & Gas	20	3¼	3¼	3¼	3¼	0
8	5¼	7¼	6¾	10	Salt Creek Cons.	35	6⅞	6⅞	6⅞	6⅞	— ⅛
26½	17	20	19⅞	10	Tidal Osage	.....	.....	.....	.....	.....	.....
43	33	33¼	33	N.P.	Waverly Oil Wks. A	.....	.....	.....	.....	.....	.....

Pittsburgh Curb Exchange

1927 High	1927 Low	1928 High	1928 Low	Par Value	Stocks	Transactions Week Ended February 24 Sales	First	High	Low	Last	Change
....	....	....	....	$ 5	Duquesne Oil.	.....	.....	.....	.....	.....	.....
95	88	....	....	25	Gulf Oil.	.....	.....	.....	.....	.....	.....
10¾	5½	5¾	5½	25	Leonard Oil & Dev.	400	5½	5½	5½	5½	0
2.70	.30	1.00	.50	10	Omar Oil & Gas.	.....	.....	.....	.....	.....	.....
2¼	1¾	....	....	5	Pittsburgh Oil Dev.	.....	.....	.....	.....	.....	.....
31	19	21¼	17½	5	Plymouth Oil.	2,833	19	19	17½	18¾	+ 1¼
6	5	....	....	5	States Oil.	.....	.....	.....	.....	.....	.....
3¼	1½	3¼	2¼	1	Texon Oil & Land.	820	2¼	2⅜	†2¼	2⅜	— ⅛
23¾	18	15	15	10	Tidal Osage Non-vgt.	.....	.....	.....	.....	.....	.....

*New High †New Low xEx-Dividend.

Standard Oil Stocks on New York Curb

1927 High	1927 Low	1928 High	1928 Low	Outstanding Capital	Par Value	Stocks	Div. Rate	Last Paid	Transactions Week Ended Feb. 25 Sales	First	High	Low	Last	Change
21⅝	17⅞	22⅜	18¼	£ 4,126,460	£ 1	Anglo-American Oil	60⅓c	May 31, 27	17,500	19½	21½	19⅜	20¾	+ 1¼
21½	17⅝	20½	18⅛	.....	£ 1	do cts. non-voting	.....	.....	1,900	18½	20½	18½	20⅜	+ 2⅛
3¾	¾	1⅞	1¼	(sh) 500,000	N.P.	Atlantic Lobos	.....	.....	200	1½	1½	1½	1½	0
6½	2½	3½	3¼	$ 10,000,000	$ 50	do pfd	.....	.....	.....	.....	.....	.....	.....	.....
69	50	56	52	1,000,000	25	Borne Scrymser	‡$1S.A.	Oct. 15, 27	50	52	52	52	52	— 3
60	45	63	58	10,000,000	50	Buckeye Pipe Line	$1Q	Dec. 15, 27	200	59⅝	59⅝	59½	59½	— ½
126	76½	149¾	117¼	3,000,000	25	Chesebrough Mfg	$1Q	Dec. 15, 27	300	125	126	125	125¼	— 9¼
22⅜	16¼	22½	16	36,057,840	10	Continental Oil	.....	Dec. 15, 27	32,000	16⅜	17¾	16	17⅝	+ 1⅛
137	89	105	94	3,000,000	100	Cumberland Pipe Line	$2Q	Dec. 15, 27	100	103¾	103¾	103¾	103¾	— ¼
68½	47	70	64⅛	5,000,000	100	Eureka Pipe Line	$1Q	Feb. 1, 28	150	67	67	66	66	— 1
13½	3½	6½	5	16,000,000	100	Galena Signal Oil	.....	June 30, 25	.....	.....	.....	.....	.....	.....
59¾	23	36	27	4,000,000	100	do new pfd	.....	June 30, 26	.....	.....	.....	.....	.....	.....
60½	35½	41¾	35	2,000,000	100	do old pfd	.....	June 30, 26	.....	.....	.....	.....	.....	.....
68½	54	68	60	73,117,577	25	Humble Oil & Refining	‡30cQ	Jan. 1, 28	7,600	59⅞	61¾	59¼	61½	+ 2
182	123¾	187½	176½	20,000,000	100	Illinois Pipe Line	$6S.A.	Dec. 15, 27	750	182½	184¼	181¼	184¼	+ 3
64¾	37¾	65¼	56¾	(sh) 6,458,267	N.P.	Imperial of Canada	‡25cQ	Mar. 1, 28	9,900	58½	59¾	56¾	58¼	+ 1
94½	61	78¾	75	$5,000,000	$ 50	Indiana Pipe Line	†$1Q	Feb. 15, 28	300	75¼	75½	75	75½	+ ¼
39	28¼	43	35	(sh) 17,123,444	N.P	International Petroleum	25c	Nov. 15, 27	78,200	35⅛	37	35	36⅜	+ 1⅜
24	13¼	24½	20½	$6,363,350	12.50	National Transit Co	25cQ	Dec. 15, 27	6,000	22¾	24⅛	22¾	24½	+ 1⅜
44½	31¼	49½	37½	5,000,000	100	New York Transit	.....	July 15, 26	550	48	49½	48	49½	+ 1½
100	70	106	94	4,000,000	100	Northern Pipe Line	‡$3S.A.	Jan. 1, 28	500	104½	106	104½	105¾	— ¾
67⅞	52	66¾	58	60,000,000	25	Ohio Oil Co	‡50cQ	Dec. 15, 27	3,300	59½	60⅜	58½	60	+ 1⅜
39	12	39⅞	29	10,000,000	25	Penn Mex. Fuel	.....	May 21, 25	2,600	33	38⅜	29	37⅞	+ 8⅞
55½	45⅜	50½	48	60,000,000	25	Prairie Oil & Gas	.....	Aug. 31, 27	10,900	48¾	49⅞	48	49	+ ¾
190	132	214	184	81,000,000	100	Prairie Pipe Line	$2.50Q	Feb. 1, 28	3,050	210	214	206¾	210	— 1
201½	175½	178	175	4,000,000	100	Solar Refining	$5S.A.	Dec. 20, 27	20	177	177	176	176	+ 1
27¼	15½	33½	21	5,000,000	50	Southern Pipe Line	$2	Dec. 1, 27	.....	.....	.....	.....	.....	.....
41½	35	40⅛	36¾	20,00,000	25	South Penn Oil	50cQ	Dec. 31, 27	2,000	37¼	39⅛	37	39	+ 1¾
83	55½	90¾	70	3,500,000	100	South West Pa. Pipe Lines	‡$1Q	Dec. 31, 27	950	90½	95	91	94½	+ 3¼
81⅛	64⅝	80⅛	70⅞	228,415,463	25	S. O. Indiana	‡62½cQ	Dec. 15, 27	43,900	71⅛	75½	70⅞	74½	+ 2⅞
20⅞	14⅜	17½	15	8,000,000	25	S. O. Kansas	.....	June 16, 24	1,100	15⅛	16	15⅛	16	+ ⅞
130	111½	132¾	122¼	17,012,559	25	S. O. Kentucky	$1Q	Dec. 31, 27	7,100	122½	129¾	122¼	127½	+ 3½
49½	40	43	39⅞	4,559,850	25	S. O. Nebraska	62cQ	Dec. 20, 27	1,600	41¼	41¼	39⅞	41⅛	— ⅜
87½	72	79	74	14,000,000	25	S. O. Ohio	62½cQ	Jan. 2, 28	150	73	73¼	73	73¼	— ⅛
122	117¼	120½	117	7,000,000	100	do pfd	$1.75Q	Dec. 1, 27	60	118	118¾	118	118	0
21	14½	26	17	30,734,000	25	Swan Finch Co	.....	Nov. 1, 19	.....	.....	.....	.....	.....	.....
149⅞	95¼	149	136¾	62,470,800	25	Vacuum Oil	‡50cQ	Dec. 20, 27	31,200	138⅛	149	136¾	146¼	+ 8⅛

*New high †New low xEx dividend ‡Also extras.

Independent Oils on New York Curb

1927 High	1927 Low	1928 High	1928 Low	Par Value	Stocks	Transactions Week Ended Feb. 25 Sales	First	High	Low	Last	Change
2⅛	.55	1½	.80	$ 5	Amer. Con. Oilfields	90,000	89	91	80	91	+11
7½	2¾	4⅛	3⅛	N.P.	Amer. Maracaibo	2,800	3¼	3¼	3⅛	3¼	0
2¾	1	4	2½	$ 10	Argo Oil	.....	.....	.....	.....	.....	.....
9¾	6¾	9⅞	7⅞	10	Arkansas Nat. Gas	500	8⅛	8⅛	7⅞	7⅞	— ⅛
20½	15½	.....	.....	N.P.	Beacon Oil	.....	.....	.....	.....	.....	.....
40	20½	39¾	32¾	N.P.	British American	400	32¾	35	32¾	34⅞	— 3¼
28¼	15½	23⅞	18½	25c	Carib Syndicate(new)	9,700	20½	23½	20¼	22	+ 1¾
26	15⅛	.....	.....	.....	do ctfs. of deposit	.....	.....	.....	.....	.....	.....
58¾	40¼	56	54	$ 20	Cities Service	34,000	55	55⅛	54⅜	54¾	— ⅛
95⅝	87	95½	94½	100	do pfd	2,200	95⅛	95⅝	95⅛	95⅝	+ ¼
8⅞	7⅜	9⅛	8⅞	10	do pfd. B	500	8⅞	8⅞	8⅞	8⅞	0
29¼	22½	.....	.....	10	do banker's shares	.....	.....	.....	.....	.....	.....
3⅞	1⅜	1¼	1¼	1	Colombia Syndicate	12,500	1⅛	1⅛	1¼	1¼	0
9¾	6⅝	7¼	6¾	10	Consolidated Royal	200	6⅞	6⅞	6¾	6¾	— ½
14⅞	9½	13¼	10	N.P.	Creole Syndicate	80,000	11⅞	13¼	11⅝	13	+ 1¼
3	.50	1½	.80	N.P.	Crown Central	200	95	99	95	95	+ 9
12	4	11	8½	N.P.	Darby Petroleum	100	9¾	9¾	9¾	9¾	0
11½	4	10⅞	7⅛	....	do trust ctfs	.....	.....	.....	.....	.....	.....
2½	.74	1⅞	1	N.P.	Derby Oil & Refining	.....	.....	.....	.....	.....	.....
16¾	4	.....	.....	N.P.	do pfd	.....	.....	.....	.....	.....	.....
3¼	1	2	1⅜	N.P.	Gibson Oil	4,300	1½	1½	1⅜	1⅜	0
2	.40	.53	.51	N.P.	Gilliland ctfs	.....	.....	.....	.....	.....	.....
118	86¼	117¼	101⅛	$ 25	Gulf Oil Corp	10,900	102¼	109¾	101¼	109	+ 6¾
2½	.80	2½	1½	10	Intercontinent Pet	13,000	2⅜	2½	1⅞	2¼	— ¼
2¼	1⅛	1⅜	1¼	N.P.	Kirby Petroleum	.....	.....	.....	.....	.....	.....
10⅞	5⅛	6⅜	5⅜	N.P.	Leonard Oil & Dev	500	5⅜	5½	5⅜	5½	+ ⅛
27½	20	23	20	N.P.	Lion Oil & Refg	700	20	20½	20	20½	+ ½
59⅝	37	55⅞	52	$ 25	Lone Star Gas	1,700	53	54¾	52	54	+ 2
2⅞	.80	1⅜	1⅛	1	Magdalena Synd	3,300	1⅛	1⅛	1⅛	1⅛	0
21½	20⅞	22⅛	22¼	N.P.	Manhattan Oil	.....	.....	.....	.....	.....	.....
52	12	45	40½	N.P.	Margay Oil	400	45	45	44	45	+ 4½
3	1½	.....	.....	$ 10	Mexican-Panuco	.....	.....	.....	.....	.....	.....
12⅛	5	6⅜	5¼	N.P.	Mexico-Ohio Oil	1,000	32	32	32	32	0
1½	1	1⅜	1¼	$ 1	Mountain & Gulf	.....	.....	.....	.....	.....	.....
29¼	22¾	28⅝	25⅛	10	Mountain Producers	5,900	25¼	25⅞	25⅛	25⅞	+ ¾
5⅛	4⅜	5⅜	4¾	5	New Bradford	3,300	4⅞	4⅞	4¾	4¾	— ⅛
6¼	4	4⅜	4⅜	10	New England Fuel	.....	.....	.....	.....	.....	.....
16	9¼	9⅞	8¼	1	New Mex. & Ariz	200	8½	8⅝	8¼	8½	0
13⅞	9	14¼	11½	25	New York Oil	300	13	13	13	13	0
12⅜	9½	12⅛	10¾	N.P.	North Cent. Texas	300	11¾	12	11¾	12	0
23⅞	21¼	.....	.....	....	Okla. Nat. Gas ctfs	.....	.....	.....	.....	.....	.....
9⅝	3¼	6	3⅞	N.P.	Pandem	3,900	4⅛	4⅜	3⅞	4⅛	+ ⅛
12⅛	7	10⅞	8⅝	N.P.	Panapec Oil	3,600	9	9½	8⅝	8⅝	— ⅜
9	7⅝	11⅜	10⅝	$ 25	Paragon Refg	.....	.....	.....	.....	.....	.....
.37	.25	.....	.....	N.P.	Peer Oil Corp	.....	.....	.....	.....	.....	.....
13½	5⅛	6⅜	5⅛	$ 10	Pennok Oil	300	5⅛	5⅛	5⅛	5⅛	0
.....	.....	4⅛	3⅛	5	Pittsburgh Oil & Gas	200	3⅞	4	3⅞	4	0
24⅜	7	12	12	25	Red Bank Oil	.....	.....	.....	.....	.....	.....
15½	3½	5½	4⅛	N.P.	Reiter-Foster	300	4⅛	4¼	4⅛	4¼	+ ⅛
28⅜	15	25½	23¼	$ 25	Richfield Oil pfd	.....	.....	.....	.....	.....	.....
7	4½	5⅜	4⅞	N.P.	Ryan Consolidated	.....	.....	.....	.....	.....	.....
8	5¼	7¼	6¾	$ 10	Salt Creek Cons	700	6¾	7	6¾	6¾	0
35½	27¼	35	28½	10	Salt Creek Prod	6,100	29	30	28¾	30	+ 1
7	1¼	2	1	5	Savoy Oil	.....	.....	.....	.....	.....	.....
26½	17	20	13	10	Tidal Osage	6,800	13¼	16¾	13¼	16¼	+ 2¾
23¾	15	18	13⅛	10	do non-voting	2,400	13⅞	16¼	13⅞	15¾	+ 2⅜
92	63½	86	84⅜	100	Transcontinental pfd	.....	.....	.....	.....	.....	.....
23¼	7	27¾	18	10	Venezuela-Mexico	200	25	26	25	25	— 1½
7⅜	4¼	6¼	4⅞	5	Venezuelan Petrol	6,800	5	5⅜	4⅞	5⅛	+ ¼
32⅜	19½	22⅞	21	N.P.	Wilcox Oil & Gas	2,200	21	21	18½	19½	— 1¾
8	4⅜	7	6	$ 1	Woodley Petroleum	500	6	6	6	6	0
6	1¾	2¾	2¼	25	Y Oil & Gas (new)	.....	.....	.....	.....	.....	.....

*New High †New Low xEx Dividend

New York Curb Bonds

Week Ending Feb. 24

	High	Low	Last	Ch'ge
Beacon Oil 6s '36	101	101	101	— ⅛
Cities Serv. 5s '66	92¾	92¼	92⅝	+ ⅛
Cities Serv. 6s '66	103⅛	103	103	0
Cities Serv. 5½s '42	94⅞	94⅝	94⅞	+ ⅛
Empire Oil 5½s '42	93⅞	93⅝	93¾	— ⅛
Galena Oil 5½s '42	87	87	87	— ½
Gulf Oil 5s '37	101⅞	101⅞	101⅞	— ⅛
Gulf Oil 5s '47	101⅝	101½	101⅝	0
Independent Oil 6s '39	98½	97½	97¾	— ¼
Phillips Pet. 5½s '39	92¾	92	92½	+ ¼
S. O. N. Y. 6½s '33	103¼	103¼	103¼	0
Sun Oil 5½s '39	102	101	101¾	— ¼
Trans Con't. Oil 7s '30	108	105	108	+3
Warner Quinlan 6s '42	99	98⅛	98⅛	— ⅞

New York Bonds

Week Ending Feb. 24

	High	Low	Last	Ch'ge
Amer. Reb. deb. 6s	102⅞	102⅞	102⅞	0
Assoc. Oil gold 6s	102⅞	102¾	102¾	0
Atlantic Refg. deb. 5s	101½	101	101	— ⅞
Barnsdall Corp. 6s	100	99½	100	+ ½
Barnsdall Corp. 6s ex-war	91¾	91½	91⅝	— ⅛
Cal. Pet. 5s	100¼	100	100¼	+ ⅛
Cal. Pet. 5½s	102	101⅞	101⅞	— ⅛
General Asphalt 6s	111	110	110	—2
General Petroleum 5s	102¼	102	102	— ¼
Humble Oil & Refg. 5½s	102⅞	102⅝	102⅝	0
Humble Oil 5s	100⅝	100½	100⅝	+ ⅛
Mid-Cont. Pet. 6½s	105⅝	105½	105½	0
Pan Amer. P & T 7s	105⅜	105⅜	105⅜	— ⅛
Pan Amer. P & T 6s	103¼	103	103⅛	+ ¼
Pan Amer. P & T 6s	93	92¾	93	0
Prod. & Refiners 8s	111¾	111¾	111¾	— ¼
Shell Union 5s	98½	98¼	98½	0
Simms Pet. cvt. 6s	103	102¾	102¾	+1½
Sinclair Con. Oil Co. 7s	100½	100	100	— ½
Sinclair Con. Oil con. 6½s	98	97	97⅛	+3⅛
Sinclair Con. Oil 6s D	98¾	98¼	98¼	— ¼
Sinclair Crude Oil 5½s	98½	98¼	98¼	— ¼
Sinclair Pipeline 5s	95¾	95	95	— ⅛
Skelly Oil 5½s	94⅛	94	94	— ⅛
S. O. N. Y. 4½s	97¼	97	97¼	— ⅛
S. O. N. J. deb. 5s	105⅞	103⅜	105⅝	— ⅛
Union Oil of Calif. 6s A	110⅜	110¼	110¼	— ⅛
Union Oil of Cal. 5s C	99¾	99¾	99¾	0
White Eagle 5½s war	94	93½	94	— ⅛
White Eagle 4½s ex war.	104	104	104	0